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100	32 oz. in.	12.5	4	lb. in.
75	36 oz. in.	9.4	4	lb. in.
50	3 lb. in.	6.25	4	lb. in.

1410101	when and				
R.P.M TORQUE	R.P.M TORQUE				
00-600 9 oz. in. 00-300 16 oz. in. 50-150 20 oz. in. 32-100 32 oz. in. 25- 75 40 oz. in. 16- 50 48 oz. in.	6-16.5 4 lb. in. 4-11 4 lb. in.				

SHADED-POLE INDUCTION GEARED MOTOR-Type 'FA'

R.P.M	- TORQUE	R.P.M TORQUE
216	4 oz. in.	13.5 24 oz. in.
108	7 oz. in.	9 30 oz. in.
54	10 oz. in.	6.7 35 oz. in.
36	12 oz. in.	4.5. 44 oz. in.
27	15 oz. in.	3.35 3 lb. in.
18	20 oz. in.	2.25 4 lb. in.

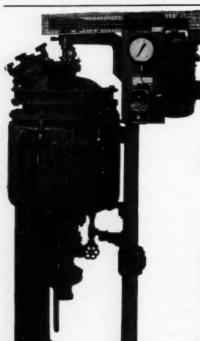
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GEARED MOTOR—Types 'N'

MOION	The was	OWNERD MOTOR TARE IN					
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1-600 9 oz. in. 1-300 16 oz. in.		456 8 oz. in. 228 13 oz. in.	28.5 3 lb. in. 19 4 lb. in.				
-150 20 oz. in.	6-16.5 4 lb. in.	114 21 oz. in.	14.2 4 lb. in.				
-100 32 oz. in. - 75 40 oz. in.			7.1 4 lb. in.				
- 50 48 oz in	2. 5.5 4 lb in	38 44 oz in	4.75 4 lb. in.				

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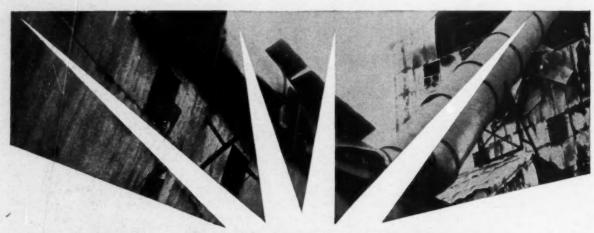


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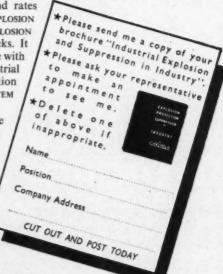
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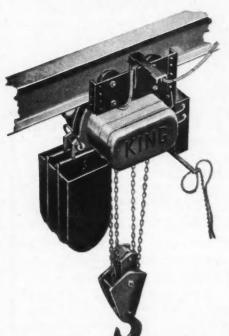
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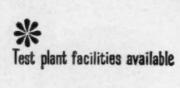
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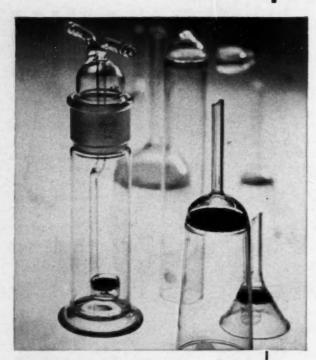
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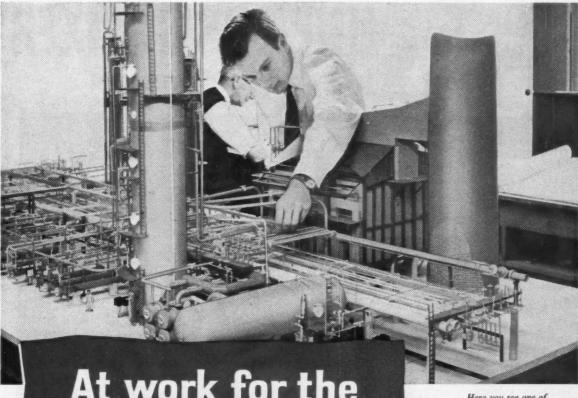
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At work for the chemical industry

Here you see one of several hundred engineers at Kellogg House working for the chemical industry.

This engineer is designing in three dimensions a section of a new chemical plant. This new three dimensional technique of designing to scale on models is one example of Kellogg's effort to constantly improve and reduce the cost of plants for the chemical industry. These models save time and money by assisting in the development of new designs, by simplifying design evaluations and by making it easier for the client to determine the need of revisions at an early stage when the cost of changes will be minimum.

When embarking on new capital expenditure programmes, executives of the chemical industry have discovered that Kellogg offers many advantages. Some firms have called upon Kellogg to develop their technical data into a complete plant design. Others have called upon Kellogg through its pilot plant laboratories in the United States to complete their technical data and confirm positively their findings. In other cases, where firms obtained their process data from their own pilot plants, Kellogg has rendered the service of designing and engineering economic plants from this data. A staff which includes hundreds of designers, planners and engineering specialists at Kellogg House, plus procurement specialists and field construction engineers has been organized to execute the expansion requirements of the chemical industry.

Kellogg is ready to serve by undertaking the tasks of engineering, procurement and construction as a completely integrated project or on an individual basis at any point in development depending on the interests of the client. Kellogg engineers welcome the opportunity of explaining the Kellogg services in greater detail.



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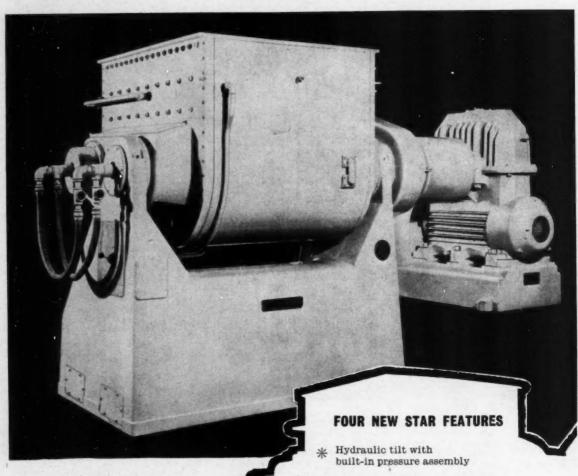
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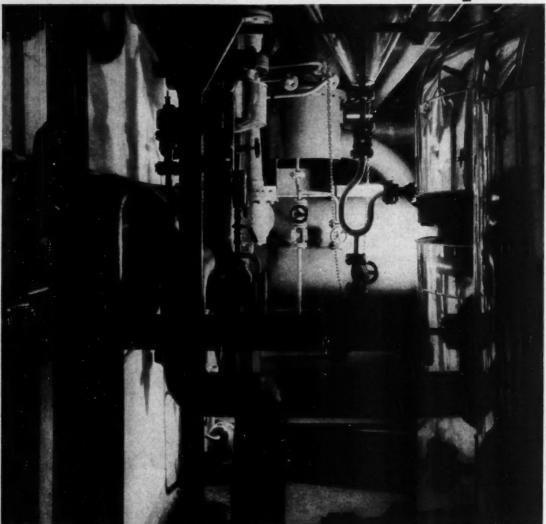
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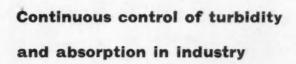
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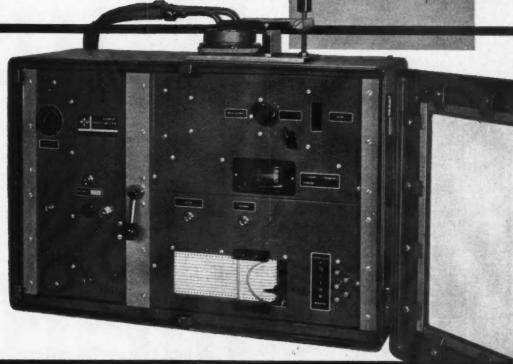
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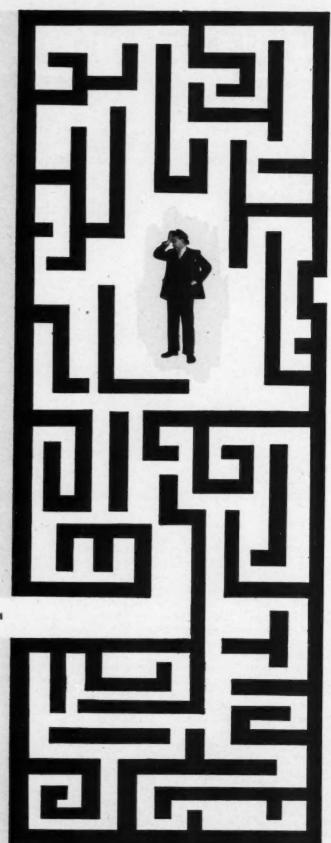
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CHEMICAL

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CHEMICAL INDUSTRY SAFETY

A CCORDING to figures issued by the Ministry of Labour, 20 million man-days are lost every year as a result of industrial accidents. The magnitude of this figure, both as regards loss to industry and to the individual can be assessed, but in terms of human suffering the loss can never be calculated.

The chemical industry, by virtue of the dangerous materials handled and the processes involved suggests to persons outside the industry that it is a dangerous one in which to work. Happily, however, the industry has a record of safety of which it can be proud and, indeed, has done much to further safety measures in other industries.

Accidents, the various reports indicate, are in most cases, preventable. Usually possible sources of danger can be, and are, fully recognised, except where they occur as a result of unexpected circumstances. Despite this a serious number of avoidable accidents result from human error—lack of judgment, forgetfulness, carelessness, faulty technique or machinery. Occasionally injury results because proper preventive measures have not been taken.

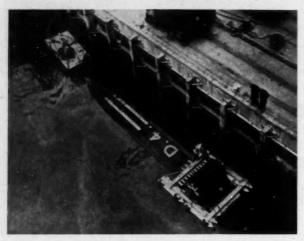
The role of the safety officer in the chemical industry is an important one and in this issue of Chemical Age the various aspects of protective clothing, safety campaigns, and handling of chemicals are considered by experienced members of the industry. A review is also included of recent developments by manufacturers of protective clothing, safety equipment and devices, etc.

Today, objections by workpeople to the wearing of apparel, footwear or headgear are no longer so frequent, and for the overcoming of prejudices, credit must be given to the propaganda issued by chemical companies, Government departments and such organisations as the Royal Society for the Prevention of Accidents and the British Chemical Industry Safety Council. Much thought has gone into the design of protective clothing and the recent aims have been to provide protection against special hazards arising from the use of new chemicals and new processes, and to allow the wearer the maximum possible comfort compatible with adequate protection.

The value of safety campaigns is considered very fully by the head of the I.C.I. Central Safety Department and one of his senior colleagues, Mr. H. R. Payne and Mr. John Gardner. They stress that whatever the type of campaign used, there must be a clearly defined aim and that co-operation by works councils, safety and production committees should be encouraged. Safety campaigns, they say are not a 'magic formula' for reducing accidents—they supply a 'shot in the arm'. Safety campaigns, however, are a means of bringing workers' problems to the notice of the management, and the indirect benefits are improved labour relations, better morale, team spirit and increased efficiency in production.

Handling chemicals is a much more awkward problem for no general rules are possible; each chemical and each reaction has to be considered separately. To some extent certain reactions can be predicted from chemical structure. Three rules which can be borne in mind for handling reactive chemicals are: know your chemical; know how hazardous situations can arise, or recognise hazardous situations; and minimise trouble sources.

Flexible Container Crosses N. Sea with First Chemical Cargo



Dracone D.4 being emptied and reeled after its return to the I.C.I. wharf at Billingham from its successful voyage to Holland

A FTER a trip to the Netherlands with a cargo of liquid hydrocarbons the flexible towed container, Dracone D.4, the first of its type to complete a deep-sea trial, has returned to Billingham-on-Tees.

Dracone D.4 has a skin, about 0.15 in. thick of woven nylon fabric, proofed inside with oil-resistant acrylonitrile-butadiene rubber and outside with neoprene, which is highly resistant to abrasion and weathering. The combination is extremely strong, light and flexible.

The cargo was loaded from road tankers at the I.C.I. wharf at Billingham. Dracone D.4 was unwound from the reel on which it had been transported to Billingham by lorry, and filled through a pipe connection as it lay on the water.

After a trial in the open sea, *Dracone* D.4, towed by the tug *Fiery Cross*, sailed on Saturday 23 May. The 260-mile voyage was completed at an average speed of 6.8 knots and the *Dracone* D.4 was berthed at Flushing on Monday 25 May.

So that I.C.I.'s shipping and technical experts could examine all phases of the handling, unloading was not carried out at Flushing but at Billingham, when Dracone D.4 returned on Thursday 28

Although the tug experienced a good deal of rough water, there were no serious problems. I.C.I.'s Heavy Organic Chemicals Division is to carry out further investigations into this method of exporting its products in bulk.

U.K.'s Gross Chemical Output Rose £135 M. in 1957 to Top £2,000 M.

ROSS output in the U.K. chemicals and allied trades in 1957 was valued at £2,101,976,000 (£1,966,768,000) while net output, including excise duties and rebates and subsidies, was valued at £656,153,000 (£614,605,000). Net output per person employed was £1,575 (£1,476 in 1956). Capital spending on new buildings in 1957 was £33,956,000 (£33,425,000 in 1956) and on new plant £129,699,000 (£108,767,000).

Gross output in the general chemicals industry (acids, alkalis, industrial gases, but not plastics materials, coal tar products, dyes, fertilisers, etc., drugs, etc., and explosives) was £418,471,000 (£399,920,000), with net output at £171,567,000 (£160,052,000). Net output per person employed was £1,789 (£1,648). Capital spending totalled: new buildings £9,666,000 (£9,154,000); new plant £49,825,000 (£41,057,000).

Gross output in the drugs and pharmaceuticals industry in 1957 was £149,456,000 (£139,482,000) and net output £79,632,000 (£74,433,000). Net output per employee was £1,518 (£1,453). Capital spending was: new building

£3,452,000 (£3,922,000); new plant £3,770,000 (£4,070,000).

For plastics materials (not including materials for synthetic textiles, such as rayon, nylon, etc.) U.K. gross output in 1957 was £120,365,000 (£104,235,000) with net output of £40,281,000 (£35,486,000). Net output per employee was £1,526 (£1,420). Capital spending totalled: new building £2,795,000 (£3,377,000); new plant £9,098,000 (£11,958,000).

These figures are taken from Vol. I of the 'Report on the Censuses of Production for 1955, 1956 and 1957', H.M.S.O., 2s net.

Printing Dispute and 'Chemical Age'

Until the dispute between the printing trade unions and the British Federation of Master Printers is resolved there is likely to be some dislocation in the production and distribution of 'Chemical Age'. We are extremely sorry if our readers or advertisers are thereby caused any inconvenience, but this matter is outside our control.

First U.K. Polythene Mesh Produced

HIGH-DENSITY polythene mesh in roll or sheet form has been introduced by the Expanded Metal Co. Ltd., Burwood House, Caxton Street, London S.W.1. It is made from Rigidex supplied by British Resin Products Ltd.

The mesh has a very low specific gravity (0.96) and is thus only one third the weight of a corresponding aluminium mesh, and less than one eighth the weight of mild steel. In all thicknesses the mesh is flexible enough to be handled very easily, and in thicknesses above \(\frac{1}{2}\) in. it is sufficiently stiff to be self-supporting.

It is available in several colours which are inherent in the polythene.

The dielectric constant is 2.35 at 1 Mc/sec, and the power factor less than 0.0001 at 1 Mc/sec. The mesh can be used at temperatures of up to 100°C with-



Illustrating high-density polythene mesh made from Rigidex by the Expanded Metal Co. Ltd., Caxton Street, London S.W.1

out significant distortion and can thus be sterilised in boiling water if required.

Uses for the mesh include guards for electric motors operating in corrosive conditions, battery separators, grilles and screens in chemical plants and laboratories and filtration supports.

Silicone Fluids Anti-Dumping Duty Taken Off

The Board of Trade have laid an order revoking the Anti-Dumping (No. 1) Order 1958 which imposed a duty of 4s per lb. on polymethylsiloxane fluids (commonly known as silicone fluids) originating in France.

British Celanese Chemical Sales Section

British Celanese Ltd., who recently announced their intention to diversify their activities in the chemical field, have set up a chemical sales development section. This section, in addition to other activities, will handle enquiries for chemicals which are, or may become, required on an industrial scale, whether or not these are at present in production.

Enquiries should be addressed to British Celanese Ltd., Chemical Sales Development, Foleshill Road, Coventry.

Fisons New Ammonium Nitrate Plant

Process Units at Stanford-le-Hope are First of Their Kind in U.K.

TEW ammonium nitrate factory with a daily capacity of 400 tons was opened for Fisons Ltd. at Stanford-le-Hope, Essex, on Tuesday by Lord Netherthorpe, president, National Farmers' Union. The liquid ammonium nitrate is transported by rail and road to Fisons fertiliser factories in other parts of the country. It will be the base material for two new compound products announced by Fisons this week; Fisons 42 (16:9:9) and Fisons 49 (14:6:20). The new project has cost £4.25 million.

The Stanford-le-Hope units are said to be the first of their kind in this country. On a site area of 63 acres, the plant also produces 223 tons of nitric acid (100% basis) a day. In addition, 92 tons of nitric acid at 57½% strength will be taken daily from the new Shell Haven facilities of Shell Chemical (CHEMICAL AGE, 30 May, p. 889). Also piped from Shell are 145 tons of ammonia/day and 48,000 tons/ day of cooling water.

Storage capacity is 2,000 tons of ammonia; 220,000 gal. (88 tons 100% HNO₃) of nitric acid in four tanks, one of 100,000 gal. and three of 40,000 gal.; and 1.5 million gal. of ammonium nitrate (8,000 tons NH₄NO₃) in two tanks, one of 1 million gal, and the other of 500,000

Two-stage Process

Ammonium nitrate is produced from ammonia in two-stage process. Part of the ammonia is oxidised to nitric acid, which is then neutralised with the remaining ammonia to make ammonium nitrate.
Contracts for both the nitric acid and ammonium nitrate plants were awarded to Chemical and Industrial International, Nassau, Bahamas. Final product is an aqueous 86% solution that is transported hot (120°C) to the compounding works.

Brian Colquhoun and Partners were civil engineering consultants and Sir Lindsay Parkinson and Co. carried out civil engineering work. Constructors John Brown acted as associates of C. and I.I., carrying out installation of the process plants; they were also responsible to Fisons for certain other design and con-

struction services.

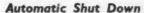
A modified Du Pont process is used for nitric acid. Ammonia is catalytically oxidised by passing a 10% ammonia/air mixture through platinum-rhodium gauze pads. Air is filtered and compressed to 120 p.si.g. in a 7,000 h.p. 9-stage rotary compressor, driven by a steam turbine and a gas turbine on a common shaft. The gas turbine, operated on heated tail gas at 80 p.s.i.g. provides about twothirds of the energy for the compressor, the steam turbine the remainder. Evaporated ammonia at 115 p.s.i.g. is fed into the air stream through a mixer and thence to the converter for catalytic oxidation. Reaction is exothermic and catalyst is maintained at about 940°C.

The hot gases containing oxides of nitrogen are cooled in heat exchangers and then in a waste heat boiler, Final cooling takes place in a serpentine cooler sprayed with water. The cold gases are mixed with secondary air and passed into a bubble-cap absorption tower, where the oxides of nitrogen are absorbed in water to form nitric acid. The product flows

continuously to storage.

A 'unique' new catalytic unit has been installed to ensure that exhaust gases leaving the stack are clean. Fuel gas is injected into the exhaust gases and the mixture passed through a catalytic fume eliminator which converts the traces of oxides of nitrogen to innocuous nitrogen. Heat produced is recovered as steam.

The purified tail gases, at 80 p.s.i.g. pass through the gas turbine which forms part of the air compressor unit and then to atmosphere. More than sufficient power to operate the plant is recovered by the gas turbine.



Except for a short shutdown every three weeks to replenish the platinumrhodium catalyst, the process is continu-The plant is fully instrumented and will shutdown automatically and safely in the event of variations from operating conditions.

Ammonium nitrate is produced by the Stengel process, developed by Commercial Solvents Corporation, New York. Nitric acid and ammonia are mixed in a special reactor to give an 86% solution of ammonium nitrate in water. The reactor is essentially a stainless steel tube packed with stainless steel rings, with a mixing device at the top. Nitric acid is pumped through a heater into the mixer where it meets a stream of ammonia vapour. The mixture passes down through the reactor and sufficient heat is developed to boil off most of the water present in the nitric

Ammonium nitrate solution and steam from the base of the reactor flow through a separator, from which the product is pumped to storage through heated stainless steel pipelines. The process is continuous and has a minimum guaranteed ammonium nitrate yield of 98% of theoretical. Plant shutdown and startup are virtually automatic.

The refrigerated ammonia storage tank is 60 ft. high and was made by Whessoe in steel, 1 in. thick at the top and 14 in. thick at the base. Said to be one of the world's largest, it stores ammonia, 99.9% pure with a maximum oil content of 15 p.p.m., at 55 p.s.i.g. at 5°C. Ammonium nitrate storage tanks are kept at 120°C by external heaters through which the solution is circulated.

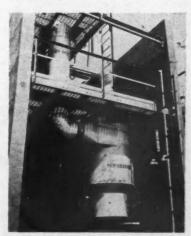


Aerial view of Fisons new ammonium nitrate works

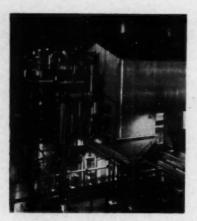
A fleet of 15 specially built road tankers, each of 2,400 gall, capacity supplies six compounding factories. Forty-five rail tankers, each of 3,300 gall. capacity and designed for an express freight maximum speed of 70 m.p.h., take ammonium nitrate to Fisons works at Immingham and Avonmouth. One train comprising 15 tankers can be loaded in five to six hours; British Railways maintain an express service at regular scheduled times.

The freezing point of 86% ammonium nitrate solution is about 77°C and ample margin is provided by the temperature of the solution as filled to prevent crystallisation en route. The rail tankers are, however, provided with steam coils in case of unforeseen delays.

Services provided include a Permutit hydrogen ion starvation-base exchange Thames water water treatment plant. for cooling is supplied by Shell Haven through a 24 in, main. Cold water is circulated to the process plants by two variable speed 6,000 g.p.m. centrifugal pumps. Return water flows via a flume



'Heart' of the factory is this Stengel reactor-separator unit, which produces 400 tons/day ammonium nitrate



Nitric acid processing area with compressor house (right), waste heat boilers and ammonium vaporiser

to an adjacent cooling tower pond from which the warm water is pumped over the cooling tower. The tower is a 5-cell film type induced-draught unit installed by Film Cooling Towers Ltd.; all cooling water pumps are by Worthington Simpson.

Contractors and consultants included James Miller and Partners for the cool-In addition to the ing water system. ammonia sphere, Whessoe also built nitric acid and ammonium nitrate storage tanks. Other work was handled by: A. J. Riley and Sons, nitric acid storage tanks; G.W.B. Furnaces, boiler installation; Wm. Kenyon and Sons, insulation; W. T. Avery, weighbridges; Hayward Tyler, process pumps.

At the opening ceremony, Sir Claver-

ing Fison, chairman, said that Fisons were the largest U.K. users of nitrogen in compound fertilisers (Fisons claim to be the largest U.K. producers of chemical fertilisers, supplying more than 40% of the plant nutrients used each year). Previously they relied on sulphate of ammonia for the N content of their fertilisers; in addition they will now use large quantities of ammonium nitrate.

That Fisons had been able to overcome the difficulties of incorporating a considerable quantity of ammonium nitrate into a compound fertiliser was greatly to the credit of their Levington Research Station and their production department. Sir Clavering added that when the project was first discussed four years ago, the cost was estimated at £4.25 million: final cost was almost the same.



2,000-ton ammonia sphere, Britain's largest, was made by Whessoe

Pilot Plant Treats Cyanide Wastes by Biological Process

Pilot scale experiments have shown that certain types of cyanide wastes can be treated by a biological process, which in suitable conditions might be cheaper than the full-scale chemical treatment plant which has been installed in many factories. This was stated in the House of Commons last week by Mr. H. Nicholls, Parliamentary Secretary, Parliamentary Ministry of Works, when asked to what extent the D.S.I.R. Water Pollution Research Laboratory had studied the treatment of electroplating wastes.

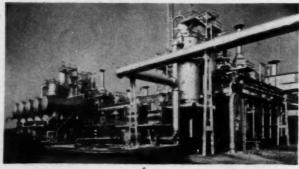
New Laboratories for Glass Research

New laboratories for the British Glass Industry Research Association were opened by Lord Halifax, Chancellor of Sheffield University, at Sheffield on Saturday, 6 June.

Since the association was formed in 1955 it had shared the premises of the Department of Glass Technology of Sheffield University.

In its four years' existence the Chemistry Section has analysed more than 400 samples of glass and raw

Power-Gas Unit for Isle of Grain



This oil gasification plant was in-stalled at the Isle of Grain for the South Eastern Gas Board by Power-Gas Corporation. It consists of four Segas units with a potential capacity of 20 million cu. ft. a day

Windscale Accident Cost Nearly £2 m.

Losses caused by the accident at the Windscale No. 1 pile on 10 October 1957 amounted to £1,967,826 according to a provisional estimate in the report of the Comptroller and Auditor General, Sir Edmund Compton, on the balance sheet of the U.K. Atomic Energy Authority for 1957-58.

A spokesman for the authority said that the write-off value of the pile was about £1,500,000 and the figure for compensation to milk producers has already been given as about £60,000.

The remainder of the loss is made up of the value of materials in the pile, chiefly uranium, which became irrecoverable, and of the cost of salvage operations, the work of sealing up the pile, and special monitoring which was carried on over a wide area.

Thiourea as Preservative Leads to Fine

THIOUREA used as a preservative for oranges led to a fine of £10 at Eckington, Derbyshire, on 8 June on the Fruit and Produce Exchange of G.B. Ltd., a London firm who supplied the fruit.

For Derbyshire County Council Mr. Barlow said thiourea was first used on citrus fruits after the war to prevent mould and rot. Experiments on rats in America showed it might give rise to cancer, though not necessarily in human beings. There was no doubt however that it might have toxic effects on human beings. Thiourea was banned America.

For the defence it was stated that the basis of the firm's contracts with Spanish growers was that thiourea was not used.

Irish Fertiliser Factory to Use Peat Mr. Lemass, Eire Minister for Industry and Commerce, at question time in the Dail on 2 June, said the government had decided to reserve Blackwater Bog in West Offaly as a source of milled peat for a factory for the production of ammonium nitrate fertiliser. He had set up a committee to examine proposals received from firms of international standing in regard to the erection of the proposed factory.

Pfizer Scholarships

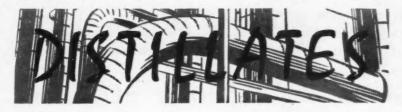
Pfizer Ltd. have awarded two university scholarships-one for science worth £370 a year and the other for chemistry worth £465.

The Scholarships go to Miss Penny Howard of Abingdon, Berkshire, and George Sayce of Hampton Hill, Middle-They were selected from over 100 sex. applicants.

Smoke from Smokeless Fuel Plant

Holmewood (Derbyshire) Parish Council are to protest about smoke pollution from the local National Coal Board byproducts plant. The plant makes smokeless fuel.

A carbonisation official said: "Recently experiments have started to find a new smokeless fuel which might, possibly, be causing more smoke."



BIRMINGHAM with its School of Analytical Chemistry at the Univerhas been the centre of many new developments in analysis and it is fitting that the award of a new trophy for young analysts should have come from that city. Midlands Section of the Society for Analytical Chemistry has inaugurated the Elwell Award for the best paper by a young analyst on some aspect of analytical chemistry.

The trophy has been donated by Mr. W. T. Elwell, chief analyst of I.C.I. Metals Division, and consists of a silver cigarette box containing inserts of titanium, zirconium, niobium and tantalum inside the lid-four metals associated with

Birmingham.

All scientists not engaged in post-graduate studies, under the age of 30, working or residing in the area covered by the Midlands Section are eligible. The successful candidate will retain the silver trophy for one year and will also receive scientific books. Closing date for entries is 30 September. Entry forms may be obtained from G. W. Cherry, section hon. secretary, at 48 George Frederick Road, Sutton Coldfield, Warwicks.

I LEARN that a U.S. Food and Drug Administration order has frozen the use of stilboestrol in animal feeds and of veterinary antibiotics containing arsenic compounds. This is the first interpretation of the Delaney anticancer amendment to the new food additives law. F.D.A. conclude that additives cannot be approved if they cause cancer in animals (stilboestrol and arsenic compounds have given rise to cancers in mice when fed in large doses).

Under this F.D.A. order, no new producers can enter the field and present producers cannot change formulas or labels or take on new customers. Existing applications are also under scrutiny by F.D.A. to see if they are still valid.

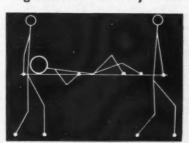
"THERE can be few if any of the manifold industries served, whose products at some stage do not require chemical examination or analysis, and the year's work has seen a great diversity in the laboratory," states the annual report of the chemical department, Manchester Chamber of Commerce Testing House. The routine examination of the composition of numerous textile materials, the assessment of dve fastness to washing and to a variety of other agencies, and the determination and identification of finishes continued on an extensive scale.

Colour fastness of yarns and fabrics to washing is at present complicated owing to the large number of tentative and accepted tests available. Some simplification is an urgent necessity and the department hopes that standardising bodies will soon give this matter their fresh consideration so that the present confusion can be resolved.

Unusual or interesting inquiries dealt with relate to the absorbency of paper towelling, the reason for goods received in West Africa having an unusually damp handle, the identity of an adhesive on surgical stockings, the nature of stains on copper wire, and the flavour and general condition of certain canned fruit.

OFTEN these days, a reviewer of a new book criticises it as being out of date. It is of course essential that the value of the book to the potential reader should be stated as fairly as possible. Unfortunately today, there appear to be so many difficulties associated with publishing a book, that delays ensue and what might have been an up-to-date work becomes out of date, with the author powerless to prevent it. I heard the other day the behind-the-scene story of quite a small book. The manuscript was sub-mitted in early 1956. At the start of the next year, when the work had been accepted, some small appendixes were forwarded to bring the work up to date. The author then heard nothing more until the beginning of this year when he received a complementary copy!

'Big Head' on His Way Home



This cartoon appears in the current issue of Fisons 'Journal'

THE Scottish Industries Exhibition in September will feature a D.S.I.R. display of new products and processes by 17 companies. In response to the department's requests for details of new products, more than 100 suggestions were received. Originally it had been intended to show only about six examples of Scottish enterprise in the field of applying research.

From a list of major exhibits I chose the following as likely to be of most interest to readers. A fire-retardant wood preservative by Celcure and Chemical Co., 300 Bearsden Road, Glasgow, W.3; material for unlubricated bearings and other parts which has a steel back to

which is sintered a layer of porous bronze impregnated with a mixture of p.t.f.e. and lead that also extends as a thin layer over the whole bearing surface, by Glacier Metal Co., No. 3 Factory, Kirksytle, Kilmarnock; an advanced and forward looking automatic data processing unit, by Honeywell Controls, Newhouse, Motherwell.

Also of interest will be an automatic self-cleaning extraction and filter press for solid-liquid separations applicable to organic and inorganic slurries, pulps and wet solids, by Sanderson and Murray, Galashiels; a cheap and non-lethal Van de Graaff electrostatic generator costing £50, by W. B. Nicolson (Scientific Instru-ments), Thornliebank, Glasgow; the first successful commercial synthesis of tropine and of the alkaloid atropine, an investigation that has led to the synthesis of many new substances, including Trophenium (phenactropinium chloride) by Duncan Flockhart and Co. Ltd., Edinburgh 11; and a static-conductive line covering to prevent electrostatic charges accumulating in situations where combustible gases or vapours are used, by Michael Nairn and Co. Ltd., Kirkcaldy.

For some time Rozalex of 10 Norfolk Street, Manchester 2, have been working on the formulation and development of non-gritty and noncaustic skin cleansers to provide a safe alternative method of cleaning workgrimed skin. The research team had in mind the increasing use of synthetic resins which stubbornly adhere to the outer layer of the skin. Now, after wide-scale field trials with the co-operation of medical officers, they claim to have produced a cleanser which is superefficient, economical, pleasant and easy to use.

The new Rozalex industrial cleanser is of a soft, jelly-like consistency, and is easily applied to the skin-picking up and suspending all grease and grime. No soap or other cleansing substance is required. Non-gritty, it contains no abrasives which could cause mechanical and physical damage to the skin. The cleanser is effective in hot or cold water.

CHATTANOOGA nylon plant of E.I. du Pont de Nemours has had killdeer nests on the roof and in the middle of the gravel drive. Possums have been spotted at night and rabbit warrens have been uncovered on the grounds; sometimes ducks alight on the pond.

These are, however, modest claims to fame in view of the fact that a complete moonshine still was recently found on the plant site by county police. The 30gall. still surrounded by a dense thicket in swampy land, was uncovered only 250 yards from the nylon plant. Police officers said it was one of the best built installations they had seen.

With this interesting example of process engineering in mind, I am beginning to wonder just what are the secrets that the British chemical industry is keeping from the technical press.

Alembia

SAFETY!

A Special 'Chemical Age' Survey of Recent Developments in Safety Techniques and Equipment for the Chemical Industry

FOREWORD

By N. F. Patterson

Chairman of the British Chemical Industry Safety Council



N F Potterson

PEOPLE not connected with the chemical industry are apt to suppose that because of the nature of the materials handled and processed it must be a dangerous one in which to work. In fact the safety record of the chemical industry compares well with those of other industries.

The importance which the industry attaches to safety is demonstrated not only by the support given to the maintenance of safe working conditions by individual companies but by the machinery which has long existed at national level to maintain high standards and to take steps to improve them.

In recent times these national measures have been further strengthened by the formation of the British Chemical Industry Safety Council. This is a joint body of the Association of British Chemical Manufacturers and the Association of Chemical and Allied Employers. Its membership is composed of senior production and other directors representative of the industry. Its task is to

co-ordinate the safety and medical activities of its parent bodies through three technical committees which deal with works safety, industrial health and statistics.

The council collects annually returns of individual works' accident frequency and duration rates from which figures for the industry are calculated. Returns of individual works are classified according to the size of works and nature of the production. The information gained is used to keep the industry informed of its performance and to plan improvements of safe working practices. The experience and practice of individual companies is studied and where appropriate circulated within the industry. This material includes films and film strips.

In extension of this service the council is producing a series of pamphlets of specific interest to the industry. The three published to date are "Medical Supervision in the Chemical Industry", "Safety Organisation in Small Works" and "Industrial Dermatitis". Other publications are in

preparation

A safety competition is at present running in the north-east as a prelude to a national competition. Of 77 works in the north-east entering the contest, 27 completed the first quarter of this year without a lost-time accident and qualified to fly for three months a pennant awarded by the council.

There are, of course, many ways in which safe working can be fostered. Therefore, although the articles which follow have not been written in consultation with the Safety Council, I was happy to accept the editor's invitation to write a foreword to this edition of CHEMICAL AGE and welcomed the opportunity of describing briefly some of the work which the British Chemical Industry Safety Council and its associated committees are doing in this vital field.

1. 2 Patts. Soz

ARE SAFETY CAMPAIGNS EFFECTIVE?

*

Giving the Accident Cause a "Shot in the Arm"

By

H. R. Payne, O.B.E.,

Head of the

Central Safety Department

Imperial Chemical Industries Ltd

and

John Gardner,
a Senior Member of
the Department



In this article, the authors stress that safety campaigns do not provide a magic formula for reducing accidents. They supply a "shot in the arm" to the accident cause. Various types of campaign and methods of organising them are described. Short and long term effects of two campaigns are given

CICCESS of an advertising campaign can be judged largely by the increased sales of the product. The results of a safety campaign, however, as with other accident prevention work, are very difficult to measure. The reduction of accidents may be due in part to other factors; for example, an improved system of inspections may be taking effect. On the other hand, the indirect benefits, such as improved morale and labour relations, which result in improved efficiency, are also difficult to assess.

As with diagnosing an illness much will depend on the symptoms. A campaign may be desirable as a 'shot in the arm' when the accident rate is increasing, or in order to drive home some particular aspect which is causing concern. Management may wish to demonstrate their interest in safety matters, or the safety officer or safety committee may want to stimulate interest among the workers.

The purpose is to alert everyone to the accident-producing hazards and their elimination; to conserve manpower, and obtain more efficient production.

There are different conceptions about the best type of campaign to use. One view is that an appeal to the competitive spirit has the most effect, and a target or definite reduction in accidents should be aimed at. Another view is that workers must be educated in detecting the hazards causing accidents, and that this produces more lasting results than the competitive campaign. The latter may lead to mistakes being

covered up, and the suppression of information.

'Competitive' campaigns. Teams led by foremen may compete against similar teams within a works, or one works may be set against anotler. The campaign which usually lasts a week may be a simple affair using special posters, or may be an elaborate one, with a daily newspaper giving the latest results, making use of a public address system, and including talks and tours of the works by various personalities.

The importance of safety is brought home forcibly, though there may be some loss of production time.

Hazard spotting campaigns. The object of hazard spotting campaigns is to make everyone realise his personal responsibility for preventing accidents. By educating people to recognise the hazards a more enduring effect is considered to be achieved.

The main feature of this campaign, which runs for five to 10 days, is a booklet containing tear-out forms in which the employee notes any hazards. Prizes are awarded for the best suggestions, and posters and notices are displayed throughout the works. Valuable suggestions are often received, and no production time is lost.

Campaign aims. Whichever type of campaign is used, it must have a clearly defined aim. Local accident statistics may show that most accidents are due to people falling, and the theme of 'better housekeeping' may be suitable. Experience has shown that the best results are achieved by concentrating on one

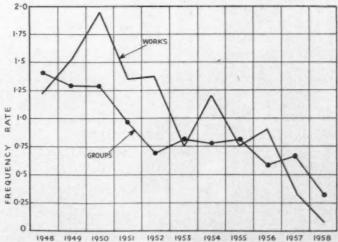


Fig. 1—A comparison of the works' and groups' frequency rate before and after the campaign held in April 1953

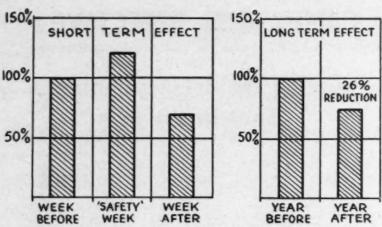


Fig. 2-Safety competition between six works; graphs show percentage reduction in accidents

simple clear appropriate theme.

Organisation. No attempt can be made here to cover the detailed organisation. Valuable guidance will however be found in Safety Organisation Pamphlet No. 5 Works Safety Weeks, published by The Royal Society for the Prevention of Accidents.

The impetus must come from the management, and their support is essen-The works manager can show the importance attached to the campaign by outlining the arrangements at a meeting of the management. He can bring out here that in addition to making the works safer, an invaluable opportunity exists for improving works relations. Heads of departments can then pass on the information to foremen and chargehands, who in turn should speak to their Foremen may need some help in framing their talks, but it is important that the talks should come from them rather than from the management.

Planning should begin early as much detailed work is involved. An established safety committee could form the nucleus with other people co-opted as necessary, such as the medical officer and, where women are employed, a woman representative. The more departments and people who co-operate the better, as the feeling grows among employees that it is their campaign, and not merely something foisted on them by the manage-

100%

50%

4 MONTHS

BEFORE

SHORT TERM EFFECT

MONTHS

Works councils, safety and production committees should be encouraged to cooperate at an early stage, and should be told about the detailed arrangements before they are published in the works.

Well handled publicity plays an essential part before, during and after the campaign, and is aimed at driving home the theme. It may consist of posters, leaflets, slogans, charts, booklets, show-cases, and exhibitions. Whatever form the publicity takes, it must be well timed and simple, and stress that every worker has a personal responsibility for safeguarding his colleague and himself. A letter from the works manager to each employee before the campaign, explaining its objects, can be very effective.

Competitions, if carefully chosen and handled, can arouse an appreciable interest, but they often please only a minority, and their lasting benefits are debatable. If a safety suggestion scheme is in operation, some extra award can be given for the best suggestions received during the campaign. Results of any competitions or schemes should be announced as soon after the end of the campaign as possible. A review of the campaign and lessons learned should be given by a person in authority, preferably the works manager. It is important that plans should be made immediately for the campaign to be followed

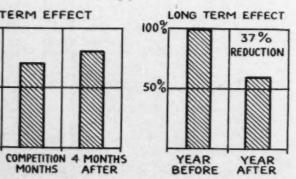


Fig. 3-Safety competition lasting four months at one works; graphs show percentage reduction in accidents

Cost. The cost will naturally depend on the scope and lavishness of the preparations. Excluding the cost of time spent on the general administration, an adequate safety week for a works of 500 men has been run at the cost of about 2s. per head. The Royal Society for the Prevention of Accidents' pamphlet referred to above gives full information on the cost of posters and literature.

Effectiveness of campaigns.—The graph (Figure 1) gives the accident frequency rates in a works employing some 450 payroll and 200 staff employees. A spot the hazard' campaign was held in April 1953, and there were no lost time accidents during the following 12 months.

Three hundred and forty one suggestions were received from 186 individuals, and these included a number from members of the staff, some quite junior. For example, a young office girl reported a cover switch missing-no one else had thought to draw attention to it before the campaign. There were no facetious suggestions, many were of great practical value, and most of them did not entail heavy capital expenditure. Some ideas were considered suitable for the company's suggestion scheme, and were therefore circulated throughout the company for possible further award.

Effects of Two Campaigns

Short and long term effects of two campaigns carried out on a competitive basis, are shown by Figures 2 and 3. Figure 2 illustrates the results of a safety week in which six works took part. A special poster was displayed, an essay competition run, and meetings, addressed by the management, were held in all works. Figure 3 gives the results of a competition in one works between teams captained by foremen which ran for four months.

Conclusion. Safety campaigns do not provide a magic formula for reducing accidents. As with a concentrated advertising campaign, they supply a 'shot in the arm' to the accident cause. Their effect is probably most noticeable where the accident rate is high. As the workers become more safety conscious, big reductions in accidents naturally become progressively more difficult, and other methods may be more successful.

All branches of management obtain valuable experience in accident prevention, and the practical side of many aspects of safety is seen in a concentrated form. The campaign gives an invaluable 'insight' into many of the works' problems and management may be brought face to face with unrealised hazards in the works. Accident statistics take on a more personal meaning. The worker gains a renewed interest in safety, and is reminded of his personal responsibility in the matter. Indirect benefits such as improved labour relations lead to better morale, team spirit, and more efficient production.

The real test is whether the downward trend in the number of accidents continues, and this calls for determined

(Continued on page 987)

Medical Supervision in Production of Tetraethyl Lead at Associated Ethyl

A NTI-KNOCK compound, which is sold under the brand name Octel to the oil industry for addition to motor and aviation gasoline is manufactured by the Associated Ethyl Co. Ltd. The main chemical constituent, tetraethyl lead, is an organic compound of lead which in its undiluted form is toxic to man.

Largest manufacturing unit of Associated Ethyl is at Ellesmere Port, Cheshire, and has been in production since the end of 1953. Here, in addition to tetraethyl lead, many other chemicals are manufactured and handled in the various processes, including mercury, metallic sodium, inorganic lead, chlorine, caustic soda, strong acids and various halogenated hydrocarbons, all of which are to some degree hazardous. To ensure the health of the employees, therefore, the Company has a comprehensive safety programme, which can be considered under three headings:

 Safety inherent in the design and construction of the plant itself.

Safety introduced as part of work methods and the use of protective clothing and equipment.

 Safety checked by the medical supervision of employees and of their working environment.

Responsible Persons

Responsibility for these rests with the design engineers in the first case, the works managers in the second and the medical department in the third, but all three have to co-operate to a high degree to achieve the desired results.

Within the works there is a modern, well-equipped medical centre, staffed by doctors, a dentist, nurses, technicians and other qualified specialists. Its main purpose is to prevent the occurrence of occupational disease and to treat illness from any cause arising at work.

Preventive Medical Programme. Absorption of lead and mercury and their compounds is essentially cumulative, and workers handling these substances are therefore kept under regular medical supervision.

Each company employee receives an extensive medical check-up before starting work, including a physical examination, blood count and chest radiograph. In this way anyone whose health does not comply with the strict standards laid down for hazardous occupations can be sorted out and placed, where possible, in more suitable work. Thus it is considered the duty of the medical service not only to ensure that healthy men are employed in potentially hazardous fields, but also to try to find suitable employment for those often regarded as unemployable owing to some defect of health.

Once they are at work, the men are required to undergo regular clinical

examinations, the type and frequency of which depend on the particular process in which they are engaged. Lead and mercury absorption can be detected by quantitative tests on the urine and in healthy subjects these can be directly related to the degree of exposure and absorption; thus, frequent routine urinalyses are carried out. The actual technique of these estimations is complex, and calls for well-controlled conditions. The analyses are performed in a specially

By
Dr. J. C. Doran
of Associated Ethyl Co's
medical centre

designed chemical laboratory some miles from the works, where chance atmospheric contamination of samples is unlikely. This laboratory is under the supervision of chemists from the research and development department. Owing to the high degree of accuracy of these tests unusual absorption of these chemicals in normal people can be detected before any clinical disease is caused. By studying the employee in this way and by combining this with other studies of his environment, the conditions of work can be assessed and controlled. The routine medical examination of all men who may be exposed to lead or mercury also includes inspection and treatment by the dental officer.

Studies of the working environment are undertaken concurrently with the inspection of the employee. On plants with a potential hazard from lead or mercury, air estimations are carried out on a routine basis and provide a continuous pattern revealing the degree of atmospheric contamination. Apart from individual interpretation, these figures, together with group urine studies, are of great value in identifying the important areas of hazard before plant or operational deficiencies become apparent.

In addition, routine inspections of all production areas are carried out by the medical officers, and any shortcomings in general hygiene, housekeeping or safe practice which have a bearing on health problems are brought to the attention of the management. In this respect, an important member of the medical team is the industrial hygienist, who is technically qualified to assess environmental conditions scientifically. His main concern is with the measurement of hazards, whether from chemicals, dust, noise or other physical factors, and he forms an important link between those concerned with the techniques of the processes and those who have to advise on the health of the men who work at them. He is also concerned with research into these problems so as to advise on methods which can be introduced to avoid or lessen these

Chlorine is manufactured by electrolysis of salt and brine, and is liquefied for storage. It is used to make chlorinated hydrocarbons. The gas is a lung irritant, causing acute distress to those who accidentally breathe it. Routine examinations and analyses obviously have no value in the prevention of exposure, the ill-effects of which are transient and rapidly reversible. Suitable protective masks are carried by the worker, but should ex-posure occur nevertheless, specific oxygen therapy and other treatment can be immediately provided in the medical centre to prevent complications and alleviate the patient's temporary discomfort.

General Medical Programme. Aim of the general medical programme is to assist in the treatment of general sickness



Associated Ethyl's pathology laboratory at Ellesmere Port

and injury when possible at work, and to help the employee in his convalescence and his placement at work on his return from sick-leave. The medical centre operates on a 24-hour basis in order to provide a cover at all times and treat such cases and any specific injury or illness occurring at work. It is staffed by State-Registered male nurses on a shift basis, with doctors on call, and in this manner continuity of treatment for the shift worker is assured. Inevitably in a large works handling vast quantities of chemicals such as sodium, chlorine, acids and alkalis, accidents sometimes occur, and the department is well equipped to deal with emergencies when they arise.

Among the ancillary medical services is the radiology department, where routine and accident examinations are undertaken. A consultant radiologist visits



R.F.D. air-supplied suit and Plus-pressure mask in use at Associated Ethyl Co. Ltd. in atmospheres containing toxic vapours

the centre at fortnightly intervals and reviews all radiographs, as well as performing any special examinations which may be requested by the works doctor after consultation with the patient's private practitioner.

In the pathology department a great amount of the work is of a routine nature in connection with the lead and mercury hazards, but the department is also equipped to carry out general investigations in bacteriology, haematology and biochemistry. There is also a physiotherapy department where patients are treated either at the request of the works doctor or of a local consultant to enable a patient to return to work at an early date. Much benefit is gained by all concerned in this way, as a convalescent patient can be treated while back in some suitably restricted occupation.

A system of sick-visiting by the nursesuperintendent maintains personal contact with patients and enables the works medical officers to co-operate with their private doctors in the best interests of the convalescent. Such co-operation with the private doctors also settles problems posed by changes from shift to day work, specialised diets (which the canteen services are asked to supply), minor surgical procedures, assistance with courses of injections, and many other forms of treatment and the disposal of patients. Much of the success and effectiveness of a comprehensive medical programme of this nature depends on a good relationship with the general practitioners and hospitals in the area, and the department is well served and fortunate in these respects.

The company's medical services extend beyond the Ellesmere Port works and each of the five establishments in the U.K. have medical centres designed to cope with local needs. In addition the company takes an active safety interest with regard to its products even when these have passed into the hands of its customers. This applies particularly to Octel, the handling of which is carefully controlled on a world-wide basis until the compound has finally been rendered innocuous by dilution with gasoline.

Included in the company's medical services is a wide network of medical consultants in all of the countries overseas where Octel is delivered. These doctors are suitably briefed on the quality of the problem presented by the handling of this hazardous material, and they provide

medical supervision on a routine basis of those who are engaged in refineries and mixing plants in the special work of educting from containers and blending with gasoline. Quarterly reports on the examination of the men, their equipment and of methods of work are sent back to the U.K. and are carefully reviewed by the medical department.

The role that medicine plays in this particular industry is already seen to be extensive, but it has only been possible to touch on certain specific medical questions in this brief article. The doctors and nurses can and do take a very active part in the general life of an industrial community of this kind, and they do much to enhance the interest and enjoyment of the working hours of the employee by their assistance in all kinds of simple human problems, as well as by the medicine which they practice. Most important of all, by their special knowledge and experience they can advise and assist in making the potentially hazardous procedures of a vital industry safe and secure for all those who work within it.

Disposal of Liquid Wastes at Monsanto's Ruabon Plant

DISPOSAL of liquid wastes at Monsanto Chemicals Ltd.'s Ruabon plant has been a serious problem for many years and has become more acute as the scale of manufacture there has expanded.

The soak-away pits used previously had to be discontinued, while the sewage treatment plant of the local authority became too small to permit discharge to the sewers. The only practical alternative was to discharge waste liquors to the nearby River Dee, taking all possible precautions to avoid pollution.

Segregation of concentrated process wastes from the much larger volume of slightly contaminated cooling water was the first system adopted. The concentrated wastes were impounded in two lagoons each of 2½ million gal. (11,340 cu. m.) capacity and automatically released to the river at a rate proportional to its flow.

This arrangement proved satisfactory for several years but ultimately dilution capacity of the river, especially during the summer months, became fully utilised. Monsanto were therefore obliged to undertake purification of all waste liquors to a degree which would permit continuous discharge to the river at all seasons.

In the present system, strong, weak and recirculating liquors are mixed in a circular chamber of 12,500 gal. capacity, and neutralisation is effected by an automatically controlled supply of lime slurry. Separation of suspended solids takes place in two circular clarifiers from which sludge is drained daily. A two-stage filter treatment is applied to the sludge, firstly on six circular filters and subsequently on a seventh rectangular filter.

Supplementary treatment of the effluent from the filter plant is provided by a large activated sludge plant, operating the Kessener brush-aeration principle. This Kessener plant, embodying several unorthodox features, has two tanks of 400,000 gal. capacity with an eight-hour retention. Rapid sand filters are used for final clarification and sludge formed during treatment is removed in clarifiers and dried on sand filters.

U.K. Firm Fitting Indian Laboratories

Baird and Tatlock (London) Ltd. have been appointed contractors for the supply of all the laboratory apparatus, chemicals and equipment for the laboratories of the £100 million steelworks being constructed at Durgapur, India, by a British consortium.

The laboratories will use the most modern techniques of laboratory analysis. In particular, the installation of directreading polychromators for steel analysis will avoid the more usual wet testing methods and enable analyses to be carried out in one to two minutes instead of over half an hour.

Baird and Tatlock were appointed consultants to the Durgapur project early last year.

R.I.C. Research Diploma

Council of the Royal Institute of Chemistry has agreed in principle to establishing a research diploma. Conditions of award have yet to be worked out but it is intended that they shall be similar to those for the Ph.D. degree. Applicants would, therefore, be required to obtain advance approval of a selected subject for research to be carried out under supervision; to submit a thesis; and to undergo oral or other tests. Eligibility would be limited to R.I.C. graduate and corporate members.

SAFE HANDLING OF CHEMICALS

Value of Taking Precautions to Avoid Undesirable Effects

LMOST every industry chemicals in these days. At one period chemicals had the reputation of being dangerous to handle, a reputation which was largely undeserved. Provided reasonable precautions are taken, and the actual users told of the possible risks attendant on the use of the chemical product under consideration, no harm should ensue. The chemical industry itself has a very good record for infrequency of accidents and it has done much to inculcate into the users of its products an enlightened view of the precautions necessary to avoid undesirable effects due to the normal properties of chemicals. Events which are recorded from time to time suggest that this advice is often completely disregarded or there is not enough care taken to see that the advice is passed on to the person who is most likely to need it. The results, often tragic, are the same in both cases.

In what can only be regarded as a broad outline of the subject I am confining my remarks to those matters which affect the maker and the user of chemicals alike. The first point to make is that almost all accidents which occur through the use of chemicals do so because the chemical is allowed to get loose and go where it should not. This being the case, it is most important that the containers for the product, be they sacks or tank wagons, are properly made and in good condition. They should also be of a suitable design to handle the goods which they are to hold in whatever conditions are likely to be met. This will be discussed further below.

Risks from Chemicals

Fire and explosion. The risks attendant on the use of chemicals may generally be put in four categories and the first of these is fire and explosion. Any chemical which has an upper and lower limit of inflammability can under certain circumstances be made to ignite and continue to burn. If the rate of combustion becomes rapid enough, there may be an explosion. The essential requirements for combustion are that there is a substance which will burn, a source of ignition and an atmosphere which will support combustion. Methods of protection rely on the removal of one or more of these conditions for their efficiency. Considering now the victims of either a fire or an explosion, the injuries resulting from an explosion are usually severe, but of the same type as any other industrial injury, namely cuts, broken limbs and burns. The same may be said of pressure bursts, as in this case a container fractures because it has not the necessary strength to withstand the pressures developed inside it. The injuries will not usually be those which could arise from direct contact with chemicals.

Advice on fire prevention is freely available from local fire services and they have a considerable expert knowledge on which they can call. The only way to lessen the effects of an explosion is to see that it does not take place; or, where the risk must be expected, to see that the process is operated by remote control and behind protective walls.

By George Green

George Green is the pseudonym of a well-known personality in the U.K. chemical industry who has specialised in various aspects of safety. In this anecdotal article he draws on his wide experience as safety officer in a number of works producing a variety of 'hazardous chemicals'

Chemical burns. In the case of burns coincidental with a chemical fire or explosion, the position is different. Chemical burns are not usually clean, as the products of combustion of the chemical may form part of the flame or hot gas which is causing the injury. Burns from chemicals, especially nitro-bodies, where acid fumes are likely to arise tend to turn septic and produce very unsightly scars. If the persons who may be called on to deal with such a burn are made aware of this additional complication they can decide in advance what is the best treatment to give in order to avoid the after effects.

Burns, whether from hot or corrosive liquids, are very common and generally the immediate sensation of heat is a warning in the case of non-corrosive materials. A similar warning is often given in the case of corrosive liquids, but not always. There are some chemicals where in certain dilutions there is no warning sensation on the skin. The worst of these is probably hydrofluoric acid at medium dilution. A case occurred within the writer's experience where a woman worker lost two fingers of one hand because of a hydrofluoric acid burn. There was a hole in her gloves and the acid she was using must have been in contact with her fingers for about two hours, and she had felt nothing. By that time it was too late to do anything. Unfortunately she had never been shown how to test her gloves and also the gloves supplied were made of an unsuitable material. Makers of protective clothing

today are very much aware of the need to use proper materials for making their goods. Nevertheless it is necessary that the suppliers of the protective clothing are told the nature of the chemical against which protection is required, so

that they may recommend accordingly.

Eye injuries from chemicals. Eye injuries, whether serious or minor, are an important class of injury caused by the direct action of chemicals.

Most chemical products entering the eye can cause either temporary or permanent incapacity. Readers of this journal will no doubt have "got the soap in their eyes" at some time, and the awkwardness caused by a very small piece of grit in the eye is well known. Transient irritations such as these serve to emphasise the need for eye protection. Some chemicals, such as strong acids, alkalis and oxidising agents can cause permanent injury to the eye. This injury may be of any degree from a slight corneal scar to complete loss of sight. Apart from the question of a chemical reaction taking place in the eye, with consequent generation of heat, the heat of dilution of a drop of a strong acid or a grain of a caustic alkali could be quite enough to cause a burn. The effect of neutral salts on protein membranes is well known. There are plenty of types of adequate eye protection on the market at the present time, enough to suit all tastes and risks. It is well to enquire before purchase if the type proposed will stand up to the duty required of it. Some years ago the writer was shown a well-designed goggle which was claimed as being suitable for use with acetone. It turned out that it was made of cellulose acetate sheet and the designer had to be steered into the use of a different material.

Cause of Dermatitis

Dermatitis. This is an ever-present hazard for which chemicals are often unjustly blamed. It is difficult to generalise on such a subject, but personal allergy is one frequent cause and lack of attention to bodily cleanliness is another. Solvents which themselves may not be the cause of dermatitis may accentuate the action of other chemicals by removing the layer of natural grease from the skin. This layer forms a very good protection against chemical attack which may account for the lower incidence of skin irritation often observed among persons with 'greasy' skins. Apart from what may be termed straight irritation by corrosive chemicals, those chemicals which are normally used in an unstable or incompleted state can cause trouble. especially where the reaction is completed by atmospheric oxidation. Certain fur dyeing processes at one time tended to cause dermatitis for this reason. The removal by mechanical means of chemicals which during processing have set hard on the skin can cause trouble by pulling out the hairs and so weaken the resistance of the skin to attack. A similar

effect may result from handling crystals with bare hands. Sugar dermatitis used to be a common form of irritation in the baking industry but the increased use of machinery has largely cut this out, Dermatitis can attack any exposed part of the body, especially the neck and wrists and the only real protection is a covering. Barrier creams are becoming very popular but a word of warning needs to be given about them. Their purpose is to provide an impervious layer between the skin and the chemical. If the chemical can dissolve in the cream, the layer will not be impervious and the user will be living in a fool's paradise. Makers of these products are fully alive to this point and can be relied upon to give sound advice on the use of their products, if they are told what they have to protect against.

Chemical entry into the body. The mode of entry of chemicals into the body is mainly by way of the mouth or nose, although entry through the pores of the skin is possible with chemicals that have an 'oily' texture or can dissolve the natural fats of the skin. When using chemicals of this type, it is advisable to wash the hands in cold water first and finish off in hot water. This ensures that the pores are not opened until the greater part of the contaminant has been removed. Where there is likelihood of lung damage there seems little point in differ-entiating between entry through the mouth and entry through the nose. Figures have been published giving the size of particles which will pass through the nose, but the amount of regular mouth-breathing which must take place makes these figures mainly of academic interest. This method of entry is important.

Dangers from Dust

Entry of solid matter into the mouth may arise from the presence of massive amounts of dust in the atmosphere or the inadvertent swallowing of a quantity of the chemical, an event which should be rare. A more insidious form of entry is by gradual doses from food eaten in the workroom or from unwashed hands. With a cumulative poison against which a resistance can be built up, the state of the victim can pass unobserved until it is too late. The value of regular medical examination of persons in contact with chemicals has been abundantly proved in the case of lead poisoning as there has been a decrease in the incidence of this affliction since examination became compul-

The use of solvents and similar compounds is tending to increase and, apart from swallowing, the main risk is vapour inhalation. The more volatile the solvent, the more likely it is to produce a toxic concentration at normal ambient temperatures and the vapour pressure gives the necessary guidance on this point. The immediate effect of the inhalation of most solvent is some form of irritation of the nose and throat and then incipient narcosis. In some cases nausea and vomiting occur. These symptoms, when they arise, should be regarded as a warning that all is not well with the arrangements for ventilation; and the conditions

of work should be examined. It may be necessary to seek specialist advice under these circumstances.

Duty of supervisory staff. To expect supervisory staff to watch for symptoms such as listlessness, obvious throat irritation or other preliminary pointers may savour of 'wet-nursing' but it is on the immediate supervisory staff that the first responsibility for the efficiency of the plant must rest, and they should be required to see that a man who is obviously ill should not be allowed to become a danger to himself and his workmates.

Handling a new chemical. The position becomes somewhat more complex when an entirely new compound is being handled. In the manufacturers' works it it known what is going into the process and it is possible, by inference from existing data, to form some idea of the risks likely to arise during production. In the case of the user, he may be dependent on high-pressure sales talk for his information. The claims made should be critically examined. The writer had occasion some years ago to examine a product which claimed to contain "no calcium sulphide or harmful depilatory" The first part was correct, but there was plenty of barium sulphide in the product.

Check on containers. It has been stated above that the container for the chemical must be suitable in both strength and material. Corrosive effects must be expected and watched for, as weakening of the walls of a vessel through corrosion may give rise to a pressure burst. There is only one answer to this problem and that is regular inspection. No opportunity should be lost to inspect the inside of a vessel so that any possible weaknesses can be detected at an early date. While considering the subject of containers, it may be well to mention returned empties.

Container Hazards

Chemicals are often supplied in containers which are stated to be returnable or non-returnable. In the former case a refund is usually given when the containers are returned in good condition, which usually means 'cleaned'. If the containers are non-returnable they may have a scrap value. In either case it is desirable that the chemicals they have had in them are removed: indeed the recipient may demand a certificate that this has been done. Cleaning of vessels is often given to unskilled labour but it is a job which must be done properly and under good supervision. Accidents occurring with containers undergoing cleaning usually take the form of an explosion with serious results.

The Chemical Works Regulations are specific in their requirements in connection with the entry into enclosed spaces. Even though the premises may not be ones to which the regulations apply, they are so very sound that no other guidance need be given. Where this operation is not a routine, it is well to give it very careful consideration so that there will be no mishap.

It is surprising how often one hears of cases where liquids have been pumped into the wrong tanks and into tanks which have not enough room to take the whole of the load. The former event can

be avoided by having every tank prominently labelled with the name of the chemical which it is intended should go into it. This labelling can also include the name by which the chemical is usually known in the works 'jargon', although the names for some chemicais may be 'not polite'. The drivers of some firms' tankers have instructions to check that there is room for the consignment before starting to deliver it, but that is not to be relied on and in any case it seems unreasonable to expect this. It is a point to watch as overflowing chemicals mean a waste of money as well as a nasty mess to clear up.

Conclusions. To summarise the position, chemicals can be handled safely if ordinary care is taken and advice sought where unfamiliar substances are being used. Substances which get outside their containers, whether they appear as solids, liquids or gases, can be potential sources of trouble. Pressures, positive or negative, greater than vessels will stand cause failure. Chemicals which react should not be packed together.

U.K. Chemical Firms to Exhibit in U.S.

CHEMICALS, plastics and chemical engineering will be among the industries represented in the British Exhibition in New York next year. The exhibition, to be held in the Coliseum Building in the heart of New York from 10 to 26 June 1960, will be, it is believed, the biggest exhibition any nation has ever staged in another country.

A government display will demonstrate Britain's leading position in scientific and technical research.

The exhibition is being organised by the Federation of British Industries through its subsidiary, British Overseas Fair Ltd., with the full support of the government, the Dollar Exports Council and the British-American Chamber of Commerce.

Cultural and sporting events will be held and part of the exhibition will show typical British institutions.

Six Nuclear Power Stations will use Birlec Dryers

AN ORDER has recently been placed with the Dryer and Gas Plant Division of Birlec Ltd., Birmingham, for two dryers to be supplied for the Italian nuclear power station under erection at Latina. To be installed in the main reactor cooling circuits, the dryers will remove water vapour from the carbon dioxide gas used in the heat transfer system. This order brings to a total of 18 the number of CO₂ dryers being supplied by Birlec for nuclear stations at Latina, Berkeley, Bradwell and Hunterston.

Birlec have also supplied the air dryer installed in the Dounreay fast breeder reactor vessel. Birlec dryers are also to be used at Berkeley, Bradwell, Hunterston and Hinkley Point atomic power stations for varied applications including hydrogen cooled alternators, instrument air drying, and reactor vessel testing. The total value of all Birlec dryers to be built for European nuclear power stations exceeds £100.000.

PROTECTING PROCESS EQUIPMENT WITH BURSTING DISCS

By J. E. Philpott, B.Sc., Johnson Matthey & Co. Ltd.

BURSTING discs are the simplest and most certain form of protection against the effect of over pressure in a closed system. They cannot fail to operate, have low inertia and open immediately to provide an unobstructed full bore passage for the discharge of pressure. Bursting discs are completely leak proof until they burst and can be made to withstand full vacuum and remain vacuum tight. Simple to install and inexpensive to replace they can be designed for use at high temperature and in corrosive conditions.

Traditional safety device for the protection of closed vessels subjected to internal pressure is the safety valve, but this has a number of serious disadvantages. Difficulty is experienced in preventing leakage, gummy or resinous fluids cause it to stick, its working parts corrode and its high inertia makes it ineffective against explosive hazards. That the modern bursting disc protection method has none of these disadvantages is being increasingly realised in the chemical and petroleum industries and other related fields.

Must Meet Two Exacting Demands

To successfully perform its function a bursting disc must meet two exacting requirements. First, when the pressure in the system it protects reaches a predetermined critical level it must burst and second, it must withstand the effect of all lower pressures to which it is subjected in normal operating. The bursting pressure of a disc clamped in an orifice of a given size, at a fixed temperature, is related both to the thickness and the tensile properties of the disc material. In order to obtain discs that burst at an unvarying pressure it is necessary to fabricate them of exact and uniform thickness and be able to reproduce precisely the composition and metallurgical properties of the disc material.

Bursting Disc Materials. Many metals and some non-metals have been used for bursting discs. By employing special techniques and close metallurgical control it is possible to produce metal foils from which discs may be manufactured that consistently rupture within 5% of the specified bursting pressure. Selection of the appropriate disc material depends upon the chemical and physical conditions to which it will be exposed in use. The base metals and alloys from which selection may be made include aluminium, nickel, copper, Monel and stainless steel. Silver is extremely serviceable over a comparatively wide range of conditions, while gold, palladium or

platinum may be necessary where severely corrosive substances are encountered.

In conditions where high corrosion resistance is necessary, but where the cost of the noble metals is a limitation on their use, composite discs of a thin noble metal film backed by a base metal foil may be conveniently employed. In this combination the corrosion resistance is supplied by the noble metal film and strength and resistance to creep is provided by the base metal disc. Discs of base metal coated with polytetrafluoroethylene are a recent development for application where discs are subjected to especially corrosive conditions below 150°C. These coated discs are particu-



Fitting a 4 in. orifice bursting disc assembly into a pipeline

larly valuable for low-pressure corrosive service.

Non-metallic disc materials have only been used to a limited extent because of the difficulty of obtaining bursting



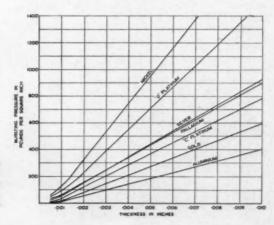
Bursting disc assemblies showing the aluminium discs and the stainless steel holders and vacuum supports

pressures that are reproducible from batch to batch. Of the non-metals investigated, impregnated graphite discs have proved most successful, especially for low bursting pressures. They will withstand differential pressure in both directions and have excellent resistance to a wide range of chemical conditions. Moreover, they are almost immune to the effect of creep at normal temperatures and can be employed where a very close ratio of working to bursting pressure is required.

Disc Assemblies. A bursting disc cannot be considered alone, it forms the crucial part of a complete assembly and for correct performances it must be fitted into an accurately machined circular metal housing that has been specially designed and constructed for the purpose.

Usually mild steel or stainless steel housings are employed, but in corrosive conditions nickel or Monel may be required. Occasionally, where conditions are of extreme severity it is necessary for a housing to be sheathed with a noble metal. It is general practice to pre-dome metal discs by applying a hydraulic pressure up to 90% of the required bursting pressure. In service, when the bursting pressure is approached the dome stretches still further and eventually ruptures by tensile failure at the

(Continued in p. 987)



Relationship between bursting pressure and thickness of various disc materials in a 1 in. orifice at room tempera-

Rubber-Proofed Protective Clothing for the Chemical Industry

Rubber-PROOFED clothing can be made in various ways. In the original form invented by Charles Macintosh, a thin layer of unvulcanised rubber was sandwiched between two layers of cotton fabric. After the discovery of vulcanisation, it became possible to make a practical garment with a rubber surface on the outside that protects the fabric from contact with liquids and is smooth and easy to clean.

Natural rubber is resistant to most of the chemicals commonly used in industry. The list includes the majority of acids, particularly in dilute form, all the alkalis, and a wide range of inorganic salt solutions; in particular natural rubber withstands hydrochloric acid up to any concentration, plating solutions for all the usual metals except chromium, the ordinary calcium, sodium, and potassium salts, and most bleaches and dyes. The chief exceptions are hydrocarbon oils and other organic solvents, and strong oxidising agents such as concentrated sulphuric, nitric or chromic acid or high test peroxide.

The problem of oil and grease is completely overcome by the use of special-purpose synthetic rubbers, and full ranges of protective clothing proofed with polychloroprene (neoprene) are in regular supply. For highly oxidising chemicals the common practice is to use p.v.c. proofings.

Importance of Seams

In the manufacture of protective clothing, special care has to be devoted to the seams. The usual method provides for double stitching, which is then taped over to provide a completely waterproof seal. Alternatively there is a special form of construction called calendered clothing, in which the entire garment is made from rubber-proofed material in its raw or uncured state and vulcanised afterwards as a single unit. Calendered clothing is frequently used at sea, particularly for fishermen's smocks which have to stand up to heavy wear in all weathers; but it is also available in the form of coats and aprons for heavy duty in the factory.

Recent developments in the design of protective clothing have concentrated largely on two aims: to provide protection against special hazards arising from the use of new chemicals and new processes, and to allow the wearer the maximum possible comfort compatible with adequate protection.

One great improvement in comfort has resulted from the development of methods for rubber-proofing the new continuous-filament synthetic fibres. Protective clothing in proofed nylon is now available weighing only about 7½ oz. per sq. yd., and in proofed Terylene between 10 oz. and 11 oz. per sq. yd. Garments made of these materials are at once much lighter and a good deal stronger than those made of traditional fabrics, and the chemical resistance of the new fibres themselves is an additional advan-

> By Stuart C. Covell, Director, Federation of British Rubber and Allied Manufacturers

tage. But however light the weight, some degree of discomfort is inevitable when working in impervious garments. It can be minimised by ensuring that the garments are large enough to allow complete freedom of movement, and by paying special attention to ventilation. Where protection is required chiefly against liquids, openings for ventilation can be provided under overhanging flaps, and experience has led to various new patterns in which the wearer's own movements promote the circulation of air inside the garment.

Where the hazard takes the form of noxious fumes or dusts, the problem is, of course, much more difficult. The extreme case is met by the plus-pressure suit as used in nuclear engineering to insulate the worker from radioactive dust. Air-supplied suits in conjunction with plus-pressure masks are also used for cleaning leaded-gasoline storage tanks, where the air supply helps to keep the wearer cool as well as to protect him from fumes and dust.

Plus-pressure masks can, of course, be used alone without a pressure suit, as for motor car body finishing work. There



Atomic protective suit in use in an active

are also industrial gas masks on the wartime respirator principle, and helmets ventilated by updraught, where the air enters through a filter under the chin and exhausts through a baffle on the crown.

Generally speaking rubber-proofed garments, whether natural or synthetic, represent high-quality in protective clothing. They are designed to last for long periods and stand up to heavy wear. If however a garment is required to last only for a limited period, there are cheaper materials made of loose-woven cotton coated on either side with p.v.c., which are light in weight, reasonably strong, and waterproof. Seams are made waterproof by doping the stitches, or by welding a plastic tape on top. Alternatively stitching may be avoided altogether, and all-welded seams substituted.

These light-weight p.v.c. garments should not be confused with the special chemical protective clothing made from close woven Terylene coated with p.v.c., and with seams double sewn and sealed over the stitches. These are long-lasting, tough, and highly resistant to abrasion and tear. They are proof against a wide range of chemicals, and are particularly useful when working with strong oxidising agents.

Cold-room Suits

For cold-room work, protective suits have been developed which have increased the time for which a worker can be usefully employed at temperatures down to -40°C from under an hour to four hours or longer. These suits have a one-piece insulating liner made from two plies of cotton poplin with a 1 in. layer of isocyanate rubber foam between. Over this is worn a blouse and trousers which can be made either from a nylon-cotton mixture, or from a double-texture rubber-proofed nylon; and if further chemical protection is required a surface coating of synthetic rubber can be added.

When working with chemicals, rubber boots in one form or another are practically a necessity. They are made in a variety of patterns from ankle-length to thigh-length, laced and unlaced, with heavy or light soles, to suit different working conditions. As with proofed garments, polychloroprene is used wherever there is likely to be much oil or grease, and p.v.c. is available for work with highly concentrated acids. There are also boots with antistatic rubber soles for use in explosives factories.

The usual steel toecap for protection against dropping weights is built into safety rubber boots as into boots with leather uppers. Some firms are experimenting also with arched steel protection for the instep, though it is particularly difficult to combine adequate



Lightweight suit and hood in cotton, proofed with butyl rubber for protection against mustard gas and other corrosive liquids

strength in this part of the boot with the flexibility necessary for reasonably comfortable wear. On the other hand steel intersoles are now established practice, and give a high measure of protection against such hazards as treading or jumping on sharp spikes or upturned nails.

For protecting the hands, rubber gloves are made in immense variety, from surgeon's gloves which are the thinnest and most supple of all, to the extremely heavy gloves of lead-rubber which are used as a protection against X-rays. In general there are two main methods of manufacture: the gloves can be built up from raw rubber sheeting and afterwards vulcanised; or they can be made by dipping porcelain or metal formers into latex or into a solution from which the rubber coagulates on the surface of the former.

For the thinner gloves, like surgeons' or household gloves, the dipping process is the only practical one; and latex-dipped gloves offer a remarkable combination of flexibility, durability and



Plus-pressure mask in use at I.C.I. Dyestuffs Division

chemical resistance. The thicker gloves, whether dipped or built from sheet, are supplied in light, medium and heavy weights and may be either wrist length or gauntlet gloves. Special rubber compounds are used for resistance to acids and alkalis, and gloves of nitrile and other synthetic rubbers are available for use where they may come in contact with oil, grease, or solvents.

For conditions of more or less severe abrasion, such as handling drums and other chemical containers, scraping and cleaning vessels, stirring, etc., the gloves are reinforced in a variety of patterns, from the inside of the forefinger and thumb only, to the whole face and back of the glove. The reinforcement is usually made with a special roughened or 'crepe' surface to improve the grip. Dipped gloves can also be made with fingers and thumb already curved, which

in some operations may be less tiring to the hands.

All protective clothing, boots and gloves when used with strong acids, alkalis or other corrosive chemicals, should be washed immediately after use with pure water or preferably soap and water. They should be stored in a cool dark place where they are protected from rough handling and mechanical damage. Properly chosen and properly treated they are among the most durable forms of protective clothing available. In fact when the Atomic Energy Commission some years ago called for a cheap range of rubber boots which would have to be thrown away on account of nuclear contamination after only 10 days' or a fortnight's wear, the industry had to exercise considerable ingenuity before it was able to design a sufficiently ephemeral product.

Bursting Discs

(Continued from p. 985)

thinnest part of the crown when the bursting pressure is reached. The predoming process is an effective aid to inspection since it clearly reveals any surface imperfection in the disc.

If the disc assembly is to be subjected to both positive and negative pressures, flexure of the foil will cause weakening of the disc and lead to premature failure. This risk may be overcome by the use of metal vacuum supports, hydraulically expanded and individually matched to a batch of discs, which prevent the discs collapsing.

Location in the Plant. The bursting disc assembly should preferably be mounted close to the vessel it is designed to protect, allow easy access for inspection and replacement of the disc and be positioned so that no sublimate or solid condensate can form on it. Where a disc is required to withstand high temperature it may be advisable to mount the assembly on a pipe sufficiently long to take it clear of the source of heat or on a short branch with a cooling jacket or the disc itself can be flooded with water. In systems where explosions may occur care must be taken to ensure that there is sufficient relieving capacity to discharge the contents of the protected vessel rapidly and to forestall the buildup of a differential pressure across the assembly after the disc has ruptured.

To prevent the loss of material when the excess pressure is relieved, the bursting disc assembly may be used in conjunction with a valve or stopcock. In the simplest case there is a stop valve mounted beyond the assembly, the valve being locked open during operation and shut off after the disc has burst.

Although the bursting disc method for the protection of chemical plant is relatively simple in conception and operation, it is backed by an impressive body of research and development. The selection of disc materials and assemblies to suit specific plant applications is a task for the expert, but disc manufacturers are willing to supply technical advice for the benefit of chemical process engineers.

Safety Campaigns

(Continued from p. 980)

and energetic perseverance which is the very basis of accident prevention.

Finally, two things must be emphasised. 1. The campaign, whatever form it takes must be whole-hearted and thus implies hard work by the management, supervisors and organisers; and 2. Before embarking on such a campaign the technical conditions in a works, which are the responsibility of the management, must be good—i.e., at a fair, reasonable level by modern standards.

Laporte Show Right Way to Service Overhead Pipelines



- MR. PETER L. WEBB has been appointed deputy managing director of Chemstrand Ltd. in charge of marketing. After education at Harrow and Bolton Technical Institute, Mr. Webb attended the University of Western Ontario. For 17 years he served in technical and management capacities with Courtaulds Ltd. in the U.K. and Canada and for the past 3½ years he has been associated with W. R. Grace Co., initiating and developing textile enterprises in South America.
- MR. H. R. PAYNE, O.B.E., one of the authors of the article on the effectiveness of safety campaigns in this week's CHEMICAL AGE, is head of the central safety department of I.C.I. and has been engaged in industrial accident prevention for 30 years. He is chairman of the national executive of the Royal Society for the Prevention of Accidents and a member of the British Chemical Industry Safety Council. Mr. John Gardner, co-author, joined the Nobel Division of I.C.I. after the war. After some years as a works labour officer he joined head office in the work study department and from there graduated to the safety department.



A

H. R. Payne

J. Gardner

- Prof. M. J. S. Dewar, M.A., D.Phil., professor of chemistry and head of the department of chemistry at Queen Mary College, London, is leaving in September to take up an appointment to a chair in chemistry at the University of Chicago, U.S. He was for a short time a lecturer at another U.S. university, Notre Dame, before joining Queen Mary College in 1951. From 1945 to 1951 he had an appointment with Courtaulds Ltd. He is a graduate of Balliol College, Oxford.
- MR. D. H. HILL, of the U.K. Atomic Energy Authority, has been appointed resident nuclear energy attaché to Mr. A. H. Tandy, the U.K. Government's representative to the European Atomic Energy Community (Euratom) in Brussels. Mr. Hill, who is 40, is a chemist, and has been on the staff of the A.E.A. Industrial Group since 1956.



- ♠ MR. C. J. DANBY, lecturer in chemistry at Worcester College, Oxford, has been awarded a fellowship and lectureship at that college,
- M. A. Hoskin, of Peterhouse, Cambridge, has been appointed lecturer in the history of science for three years from 1 October.
- MR. LAURENCE S. YOXALL, managing director of Foxboro-Yoxall Ltd., Redhill, Surrey, has joined the board of the Foxboro Co. Foxboro, Massachusetts, U.S. In addition to the British and U.S. companies Mr. Yoxall becomes directly concerned with the operations of the Foxboro Company Ltd., Canada, the new plant being built for Foxboro (Nederland) N.V., Holland, and the Foxboro interests in Japan.



L. S. Yoxall

- DR. B. G. DICKENS has been appointed Director-General of Atomic Weapons, Ministry of Supply, in succession to MR. E. S. JACKSON. Dr. Dickens, aged 50, became director of guided weapons research and development at the Ministry of Supply in 1956 and director of guided weapons (ballistics) last year Mr. Jackson is taking up another M.o.S. appointment as under-secretary in the Programmes and Research Division.
- ♠ MR. HECTOR D. WALKER, sales director of Constructors John Brown Ltd., left London Airport on Sunday, 7 June, for a fortnight's tour of the U.S.
- Back from a tour of Africa, Mr. J. W.





● MR. PATRICK D. O'BRIEN, managing director of Laporte Industries Ltd., has been elected chairman in succession to MR. L. P. O'BRIEN, who will retire from the board on 16 July. Mr. L. P. O'Brien has been with the company for 35 years and chairman of the board for 16 years.

Mr. R. B. Craig will also retire from the board on 16 July.

■ MR. CHARLES F. BONNET has been appointed associate director for the European region of Cyanamid International at the company's European headquarters in Zurich. He has been associated with Cyanamid for 25 years and has for the past three years been manager of Cyanamid's Fortier plant near New Orleans, Louisiana.

TRADE NOTES

Glycerine Price Increased

Glycerine Ltd. announce that because of the increasing world price for glycerine they have had to increase the price of refined glycerine by £20 a ton.

A new price list is available from the company at 8 Tudor Street, London E.C.4.

New Grades of Bakelite

Advance information sheet E.34 published by Bakelite Ltd., 12-18 Grosvenor Gardens, London S.W.1, gives details of two new grades of epoxide/glass laminates—DH.19073 natural and DH.19074 natural. They include copper-clad vergions

Change of Address

Elga Products Ltd. and Deionisation (Elga) Ltd. are now at Lane End, Bucks. Tel. Lane End 396.

Wax Matting Agent For Lacquers

Technical service bulletin 60 issued by Bush, Beach and Gent Ltd., Marlow House, Lloyds Avenue, London E.C.3, deals with their A-Wax BASF as a matting agent for lacquers. The matting effect is caused by a very fine dispersion of wax crystals through the lacquer coat.

The bulletin also introduces Emulsion Lk 5002, a resin emulsion for floors.

Air Sampler

The Hi-volume caddy sampler for dusts, fumes and gases, is a continuous duty vacuum pump that samples air at the rate of 4 c.f.m. It rapidly collects enough dust on 2 in. or 3 in. filter discs on which to perform chemical analysis. Membrane filters, glass fibre, or paper filters may be used with the unit. The vacuum pump is mounted on a cart with 6 in. rubber wheels enabling it to be moved to different sampling locations within a plant. European agents of the manufacturers, Gelman Instrument Co., Chelsea, Mich., are B.I.R.N., s.a., 1026-1048 Chaussee de Louvain, Brussels 14.

Air Pollution Tests

Three instruments for the investigation of air pollution are available from Glass Developments Ltd., Sudbourne Road, London, S.W.2. They conform to the designs laid down by D.S.I.R. and described in the booklet 'Measurement of Air Pollution'. The instruments are the B.S. deposit gauge for the collection and measurement of atmospheric impurities deposited by their own weight or by the assistance of rain and apparatus for determining sulphur dioxide by both the volumetric method and the lead peroxide method.

North Developments in Protective Clothing

A number of new and improved lines have been introduced by James North and Sons Ltd., 52A Tottenham Court Road, London W.1. In the field of gloves there is a new range of loop-pile fabric gloves with heat and cold resisting properties, suitable for handling oily or heated surfaces; a range of extremely lightweight p.v.c. gloves, North Plastochrome, for lighter industrial applications; and a new p.v.c. glove coated on the palm and fingers only, leaving the cotton back of the hand free of p.v.c. to allow maximum ventilation.

North p.v.c. chemical-resistant clothing is available in a wide range of garments which can be used to make up complete outfits of protective clothing for use in the handling of noxious and dangerous chemicals of all types.

Bi-Colour Safety Lenses

With the co-operation of glass lens manufacturers, the Hadley Co. Ltd., Portsmouth Road, Surbiton, Surrey, have introduced a Bi-colour lens which when



Hadley type 011/a industrial safety spectacles, incorporating bi-colour lenses

glazed into safety spectacles has been found acceptable for use by metal pourers. Of the safety laminated type incorporating a dyed inter-layer, two-thirds green, onethird clear, the lenses can be glazed into any Hadley frame with either the green portion at the bottom or top of the frame.

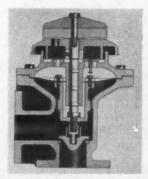
The lenses protect the operator from molten metal splashes and other flying particles. The green portion reduces glare and the clear portion can be used to inspect or look through in the normal manner. These spectacles are produced in three bridge and temple measurements.

Unbreakable Button

Dainite unbreakable buttons and nonslip slide buckles for use on protective clothing have been developed by the Harboro' Rubber Co. Ltd., Market Harborough, for workers in the chemical industry where conditions are such that friction constitutes a danger. In addition to the safety aspect, these products do not have to be removed for laundering. Samples are available on request.

Butler Oil Sealed Bearing Relief Valve

A novel type of pressure relief valve designed to overcome some of the difficulties inherent in valves which have to operate under somewhat corrosive conditions has been developed by William



Butler relief valve for use in corrosive conditions

Butler and Co. (Bristol) Ltd. Manufacture and sales are being exclusively handled by Robert Harlow and Sons Ltd., Heaton Norris, Stockport, Ches.

The dead weight valve is principally designed for use on atmospheric and vacuum stills of all sizes, and chemical process vessels in the low pressure range. Designed for setting at any predetermined pressure up to 15 p.s.i., the valve is produced in double flanged patterns in 1 in., 2 in. and 3 in sizes.

The valve incorporates a diaphragm which can be supplied in p.t.f.e. or standard jointing material, etc. Purpose of the diaphragm is to retain an oil seal around the vertical spindle bearing, designed in such a way as to prevent any possibility of corrosive vapours effecting the bearing. It is virtually impossible therefore for the valve to fail to operate in an emergency. A further feature of the valve is that when the valve lifts, oil is displaced rapidly at a high rate of flow, thus enabling the valve to lift to its full extent very rapidly. After release of pressure a dash-pot arrangement comes into play, which causes the valve to



'Chemical Age'

Review of

Safety

Equipment,

Instruments

and Protective

Clothing

float comparatively slowly on to its seat, thus maintaining the valve and seat in good condition for very long periods.

In works tests, the valve has been made to operate through hundreds of cycles and it has been found to be completely pressureand vacuum-tight on completion. A labyrinth seal, which retards the passage of hot vapour to the area below the diaphragm when the valve lifts, enables the valve to operate at high temperatures without trouble arising from overheating the diaphragm.

Harrimonde Overalls with Guaranteed Button Holes

Overalls in nylon or Terylene by Harrimonde Ltd., The Hyde, Lower Bevendean, Brighton, have buttonholes that are guaranteed. A new device which heat seals buttonholes ensures that they will last the full life of the garment. Among models available are single-breasted jackets in either white or grey 205 denier nylon and single-breasted full-length coats in nylon with three pockets.

Light-Duty Helmet

Lightness and strength are combined in a new type industrial helmet for light duty which has a fibre shell and specially reinforced exterior to provide maximum protection. The cap mouldings are made in one size with an inner cradle of p.v.c. coated nylon webbing fitted with a polythene headband simply adjustable in size from 6½ to 7½ and detachable for easy cleaning. Fluted air vents on the outside of the helmet help to keep it cool when worn in hot climates or conditions of extreme heat.

The helmet, the Cromwell M8/11, produced by Helmets Ltd., Wheathampstead, Herts, complies fully with B.S. 2095. Standard finish is black or white but other colours are available to order for quantities over 100. Cap lamp fittings will be supplied free if requested when ordering.

Safety in the Laboratory

'Safety in the Laboratory' is the title of an 86-page publication issued by Philip Harris Ltd., makers of scientific instruments and laboratory furniture, 63 Ludgate Hill, Birmingham 3. The author, Dr. J. Newton Friend, discusses disposal of waste, protective clothing, labelling, porterage, storage, methods of manipulation, handling of bench reagents, locker equipment and first aid treatment.

Hendrey Mercury Vapour Concentration Meter

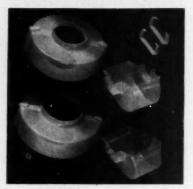
Mercury vapour concentration meter, type E.3472, has been introduced by Hendrey Relays Ltd., 392 Bath Road, Slough, Bucks, for measuring the amount of mercury vapour present in the atmosphere of a laboratory or works building where quantities of mercury are regularly used. The instrument measures the absorption of u.v. light in mercury vapour by means of a photo-cell. Activated carbon is the filtering medium.

Two sensitivities are available, one giving full-scale meter reading at a concentration of 770 micro-grammes of mercury per cu. m. of air, and the other giving full-scale

reading at a concentration of 200 microgrammes per cu. m. of air. Any recorder can be used providing its impedance is not less than 1,000 ohms. and ideally it should have a full scale sensitivity of 10 millivolts. Reading can be made about 10 minutes after the mains and u.v. lamp have been switched on. Maximum stability, however, will be obtained after running the instrument for an hour.

Rigid P.V.C. Flange Shields

A range of rigid p.v.c. flange shields is available from I.M.P.A. Ltd., Barnbrook Works, Fountain Street, Lancs, for clipping



I.M.P.A. flange shields

over pipeline flanges where corrosive liquids are concerned. While these shields do not stop leaks they protect personnel and plant from any unexpected leaks and drips; being reasonably transparent, leaks can readily be detected through the shield.

Construction in Darvic rigid p.v.c. gives resistance to a wide range of chemicals as well as high impact strength and light weight. They can be supplied with opaque coloured tops.

Terylene and Safety

Protective clothing, safety harness, fire hose and ropes made from 'Terylene' are being increasingly used. Overalls, laboratory coats and boiler suits are easily cleaned and need little or no ironing; they are also hard-wearing and resistant to attack by acids and corrosive chemicals. It is stated that in one of I.C.I.'s Metal Division plants, operatives' boiler suits were degraded after four weeks in the acid-laden atmosphere despite the use of gloves and aprons. After two years wear, Terylene boiler suits are said to show little more than no rmal wear and tear.

Terylene webbing is suitable for industrial safety belts and harnesses because of its great strength and resistance to rot, acids, flexing and abrasion. It is also easy to maintain and requires no special storage precautions. John Morris and Sons Ltd., Manchester, have made safety belts for several I.C.I. divisions, while the Irving Air Chute Co. Ltd., Letchworth, have recently introduced two new belts. SH/5 is a vertical lift harness which is particularly suitable for the inspection of gas holders, vats and other smooth surfaces. SH/6 is a suspension harness for use on steep slopes.

R.F.D. Co. Ltd., Godalming, and the G.Q. Parachute Co. have both developed



This Opal suit made by R.F.D. from Terylene and fitted with safety harness is being used at I.C.I. Billingham

a combined safety harness and protective suit. R.F.D.'s Opal suit is made from p.v.c.-coated Terylene, while the G.Q. Parachute suit has a Terylene rope attachment.

Lined fire hose made from 100% Terylene is immune to rot and will always be ready for an emergency even if used or stored under very adverse conditions. In addition it has excellent resistance to acids, noxious fumes and abrasion. Because they resist acids, rot and abrasion, and absorb little moisture, Terylene ropes are said to be safe and easy to handle. The Clayton Aniline Co. found it safer to change to Terylene for all their lifting ropes.

Anti-Mist Chemicals

A new anti-mist chemical which has had trials with a nationalised transport industry has been introduced by Industries Group Sales Ltd., 7 Rugby Street, London, W.C.1, for a number of uses, including the prevention of mist forming on instrument dials, the observation of equipment through glass during humid or steamy conditions and the prevention of mist formation on the inside windows of vehicles.

This anti-mist product may be applied on wet or dry glass, any dirt being removed during application. It is also an antistatic product and in dry weather prevents the attraction of dust to the glass. The mono-molecular layer which is deposited is not easily removed by dry-dusting, although it is removed by ordinary washing materials.

The product incorporates a volatile spirit which dries off moisture immediately after application. A "fairly recently developed chemical" enables the spreading and wetting agent to remain in position under conditions of saturation; it is said not to cause any sticky build-up. The producers have combined an anionic spreading and wetting agent with a strong cationic quaternary compound.

Propane Stacker Eliminates Noxious Fumes

The Industrial Machine and Equipment Co. (Brimpex) Ltd., who have recently moved to a new modern factory, at Yorktown Industrial Estate, Camberley, Surrey, claim to be the first to introduce a propane gas fuel stacker. Advantages of

the hand-propelled stacker are that it can be operated without cumbersome flex or heavy batteries, while the efficiency of the gas engine achieves a practically complete combustion which eliminates obnoxious fumes completely. The stackers can, therefore, be used indoors even in industries where, up until now, it was not possible to use internal combustion engines.

In a recent test the machine lifted 60 tons in an hour at the low cost of 11d. The 10-lb. Bottogas containers are easily exchanged. A refill which under normal use should last at least a week costs 6s. 8d.

The lifting capacity of Brimpex stackers is up to 7-cwt, at a rate of 40-ft, per minute and 5-ft, and 7-ft, high lifting stackers are available.

Vapour and Gas Detectors

The Ringrose inflammable vapour detector will, it is claimed, detect and signal the presence of any hydrocarbon vapour in normally free air. Manufactured by International Gas Detectors Ltd., Great Wilson Street, Leeds 11, the unit is contained in a brass cylinder, the vapour gaining access through gauze protected inlet ports. The detector operates an electrical contact which closes the alarm circuit, the current being taken from a 4 volt dry cell or from the mains.

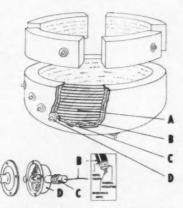
The Ringrose automatic gas detector for distant signalling will detect any inflammable gas or vapour. It gives an automatic signal on the spot and operates a distant signal, either light or bell, at a predetermined percentage of inflammable gas or vapour. Like the inflammable vapour detector it depends on changes of pressure set up inside a sealed porous pot into which mixed gases from the surrounding atmosphere enter continuously by diffusion, the gas to be estimated being burned or absorbed inside the pot.

Electric Surface Heaters for Flameproof Areas

Isomantles type FPM have been designed by Isopad Ltd., Barnet By-Pass, Boreham Wood, Herts, for use in flameproof areas and have been accepted by the authorities. Fig. 1 shows construction of the flameproof Isomantle. The heating element (B) fitted to the glass cloth heating surface (A) is mineral insulated and metal sheathed (usually stainless steel) terminating in flameproof gland (C) and flameproof junction box (D).

The element sheath is earthed through the flameproof junction box so that no sparking or short circuit is possible, even in the event of spillage. Surface temperature of the heating element must, of course, be kept below the ignition temperature of the vapours or gases present.

Process vessels of all types with capacities of between 5 and 3,000 gall. can be fitted with flameproof Isomantles. The same type of construction is also available for drum heaters. A full range of control equipment is supplied. For larger controls, intrinsically safe equipment is often used, whereby the control circuit itself does not carry enough power to generate a spark capable of exploding a vapour or dust mixture. In such cases, the control panel housing relays, etc. is kept in a safe area



Method of construction for flameproof Isomantle

while the control heads of the automatic control are placed next to the Isomantle equipment in the flameproof area. Alternatively, the control equipment is available mounted in Buxton certified housings.

I.D.L. Gammalarm

Gammalarm type 666 radiation warning system, manfactured by Isotope Developments Ltd., Beenham Grange, Aldermaston Wharf, near Reading, operates a warning light, buzzer or bell at any specified does rate within the range. The range of the instrument is 0.2 to 2mR/hr., corresponding to 20 to 200 counts per second. In addition to built-in audible alarm, remote indication can be given. The instrument can also operate door interlocking systems.

Hydex Waterproof Clothing

The new low twist p.v.c. coated fabric, Hydex, introduced by I.C.I. (Hyde) Ltd. is said to be tougher, harder to tear and yet lighter in weight than conventional coated fabrics. Jeltek Ltd., Green Lane, Hounslow, Middx, have in conjunction with I.C.I. (Hyde) produced numerous suits from Hydex, many of which have been thoroughly tested under working conditions in the chemical industry. Swatches are available on request, also sample Hydex garments.



I.C.I. Hydex for this suit made by Jeltek, is a 2½ oz/sq. yd. low-twist nylon-base cloth proofed with p.v.c. to a total weight of 9 oz./sq. yd.

The object of using low twist fabrics is to minimise the reduction in tear strength that occurs when the fabrics is coated. By omitting the process of twisting the yarn before weaving, a flat ribbon-like yarn is produced; these yarns group to meet any strain put on the fabric and the tearing load is taken by a greater number of yarns.

Multelec Electronic Strip-chart Recorder

Mark 3 Multelec electronic strip-chart recorder, newly introduced by George Kent Ltd., Biscot Road, Luton, Beds, has many uses in the chemical industry and is available fitted with any one of a variety of alarm-contact arrangements designed for reliability and safety. The voltage derived from the slidewire (reference potential) is compared with the input potential, the resulting error signal being converted into a mains frequency a.c. by a synchronous converter and then amplified electronically. The amplifier output is fed to the control winding of a servo motor which drives the pen and rotates the slidewire contacts until the error signal is again zero and balance is obtained.

Winchester Bottle Carrier

'Safety first' Winchester bottle carrier is made by Laboratory Apparatus and Glass Blowing Co., 77 Grosvenor Street, Manchester 1, with a body of black plastics and rubber. Said to be mechanically indestructible and chemically inert it has a stainless steel carrying handle. The product will carry one Winchester bottle containing corrosive and dangerous liquid and is designed to prevent burns and serious accident to personnel and clothing. Price is 50s. each.

Carboy Tipper and Truck

The Maglan carboy tipper and truck is said to ensure the safety of staff when handling or pouring from carboys. Manu-



Langley carboy tipper and truck

factured by W. Langley and Co. (Mechanical Handling) Ltd., 14-16 Magdalen Street, London S.E.1, use of the equipment enables the carboy to be picked up without touching it and moved over any distance. The truck will deliver the carboy into the cradle of the tipper. After securing the carboy with neck clamp and hook it can be raised to the pouring position; once in this position the liquid can be drawn safely using the handle provided.

The tipper is constructed from tubular

steel and its cradle is mounted on trunnion bearings.

Lead for Protection Against Radiation

A new material consisting of a series of lead scales, each sealed in a flexible plastic envelope and imbricated to overlap its neighbour has been introduced to protect specific parts of the body against radiation. Flexibility is obtained in this way, combined with all the merits of sheet lead of known thickness. It can be bent, folded and shaped to body contours and may also be cleaned or sterilised by autoclaving.

Thickness of the lead scale is usually 0.25 mm., but because of the overlap design some 80% of the area is covered by two or more scales. Further details are available from the distributors, Cuthbert Andrews, Bushey, Herts.

Quicklock Doors for Pressure Vessels

Pressure vessels with a range of special locking devices are manufactured by the Leeds and Bradford Boiler Co. Ltd., Stanningley, near Leeds. Their Checklock safety device consists of an extra trigger mounted on the front of the keep ring which is automatically set when the main triggers are moved on. When these are unfastened, the Checklock trigger is not moved at all, so that the door can only open an inch or two immediately it is first unfastened.

The company also has available its L. and B. pocket safety chart, a handy personal guide for slingers and others who use chains, wire ropes and fibre ropes. The chart was produced as the result of an accident in the company's works due to overloading. Measuring 4 in. by 3 in. and engraved on ivorine, it gives maximum safe working loads on sling chains and a special chart enabling the weight of steel plates to be estimated easily and quickly.

Terylene Fire Hose

The new Terolyte rot-proof fire hose is 100% Terylene jacketed and has a specially compounded extruded seamless p.v.c. lining bonded direct to the jacket without any adhesive by a Plastibond method. The producers, McGregor and Co., Scott Street Works, Dundee, state the hose can be stored wet or under damp conditions without any deterioration.

It is suggested that this hose will have many applications in the chemical and allied industries because Terolyte is unaffected by acids and alkalis except in very strong concentrations. Moisture absorption is extremely low and abrasion resistance high.

Flame Proof Gloves

A range of flame-resistant protective gloves is manufactured by the protective equipment division of Martindale Electric Co., Ltd., Westmorland Road, London N.W.9. The gloves are coated with p.v.c.



Martindale p.v.c.-coated gloves

to render them resistant to heat, chemicals, acids, grease and oils. They are extremely flexible, and while affording protection for the hands, they do not in any way hamper the wearer's movements.

The tough p.v.c. coating is bonded on to an interlock fabric lining. This internal support, while making the gloves more durable, does not reduce their flexibility. The number of seams in the gloves has been reduced to a minimum and they are positioned away from wearing surfaces.

The gloves can easily be cleaned and sterilised by washing in boiling water using a mild detergent or soap. They can also be turned inside out and the linings washed—an economy as well as a health measure as it ensures a longer wearing life. They are available in rough or smooth finishes for medium, light and heavy work: with open or close fitting wrists; and also with ribbed safety palms.

Martindale Electric also produce a new outdoor siren suitable as a warning device on overhead cranes.

Safety Harness Belt

Protector nylon safety harness belt is available from J. E. Mercer, Redlam Works, Pleasington Street, Blackburn, manufactured from specially woven high tensile nylon web, heat treated to retain shape and to improve high performance. An improved Embee shock absorbing

unit incorporated with the high elasticity nylon suspension rope is said to reduce greatly the risk of injury in the event of a fall.

Minimum breaking strain is 2,500 lb. Complete with 10 ft. long suspension rope with hand-forged snap spring hook and spliced-in end, weight is only 2 lb. Also available are rescue belts fitted with adjustable leg straps and emergency escape rope ladders.

Flame Resisting Clothing in Glass Cloth

The latest Merryweather fire fighting clothing is the Mefisto flame resisting suit, designed and developed for use by fire brigades and industrial rescue workers. The Mefisto suit is made of glass cloth which has a cloth-like texture and a silken sheen. Glass cloth is highly resistant to heat and can withstand a very high temperature.

Natural sheen of the material also reflects heat and helps the wearer to keep cool quite apart from the heat insulating properties of the suit's construction. One intermediate lining is of flannel, while the inside lining is of Terylene. A compressed air cylinder is carried in a pocket at the back of the suit. Manufacturers are Merryweather and Sons Ltd., Greenwich High Road, London, S.E.10.

Faceshields and Goggles

A range of safety eye and faceshields is produced by Mine Safety Appliances Co. Ltd., Queenslie Industrial Estate, Glasgow, E.3. Model FS14 and FS15 are available in vizor depths of 4 in., 6 in. and 8 in. Prescription glasses can be worn under the shields and the vizors swivel upwards as necessary.

Two new Safeseal rubber goggles give maximum protection against dust, chemical and acid splash, smoke and fumes. Model S100 is without ventilation, and Model S101 has acid-proof polythene ventilators, baffled and screened. Lenses are of toughened glass and prescription glasses can be worn underneath the goggles.

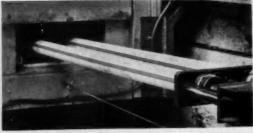
The M.S.A. Skullgard is made from a high pressure moulding of glass-fibre reinforced polyester-resin. The shell is water-resistant with colour fastness guaranteed. The detachable harness has a quick clip-on attachment.

Reactor Safety Equipment

Transistorised reactor safety equipment manufactured by Mullard Equipment Ltd., Mullard House, Torrington Place, London, W.C.1, uses transistor circuits throughout o effect the necessary switching. The system embodies the principle of failure-to-safety required for applications in nuclear reactors. Construction employs printed wiring boards mounted on hinged frames in a "book and page" assembly for rapid circuit access.

Low-Voltage Device for Arc Welding

The Murex low-voltage device has been developed to minimise the risk of electric shock when welding under certain circumstances, for instance with a.c. equip-

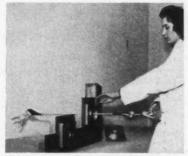


100% Terylene jacketed Terolyte fire hose by McGregor and Co. is being lined with p.v.c.

ment in damp conditions. The unit operates automatically and as soon as the arc is broken it reduces the voltage at the electrode holder to a low value. The device is designed by Murex Welding Processes Ltd., Waltham Cross, Herts, to "fail-to-safety".

Manipulator for Radio-Active Materials

A manipulator for radioactive materials has been introduced by Nuclear Research Applications Ltd., Emefco House, Bell Street, Reigate. Known as Emefco type



Manipulator for radioactive materials

T5 it is a development of type T4 and is intended for use as a remote handling tool for isotopes in the open. The remotely operated rotating head, rotating through 370° has a handgrip with a holdfast clamp. The gripping claws can hold either a beaker or an isotope capsule, or even pick up a pin. Standard length of the tool is 3 ft. 6 in., 5 ft., 6 ft. and 8 ft.

Shaft of type T5 is an accurately machined and polished tube for which a special split sphere has been designed so that it can be used through a lead wall. Head of the tool is offset 45° to give a great universality of positioning and the tool can be completely removed from the chamber and the latter sealed with a plug plate or normal Harwell type detachable head.

Nuway Industrial Matting

Industrial matting by the Nuway Manufacturing Co. Ltd., Endurance Works, Coalport, Ironbridge, Salop, can be supplied in fibred rubber material or oil-resisting fibred p.v.c. links. Rubber insertion blocks are now being produced for use with Flowforge flooring grids. These inserts are of the same tough, resilient, non-slip material as is used on Nuway matting, and have been developed and marketed by Nuway in co-operation with Fisher and Ludlow Ltd., Material Handling Division, Birmingham 12, makers of Flowforge open steel flooring systems.

Gas Shut-Off Valve

Designed for use on laboratory equipment, the Monitrol automatic shut-off valve, a product of Parkinson Cowan Instruments, 7/17 Fitzalan Street, London S.E.11, is incorporated into the main gas supply to the appliance. It consists of a pilot burner heating a thermocouple element and thereby generating a small

electric current which holds open the main valve of the device by means of an electromagnet. If the pilot burner goes out because of failure of main gas, draughts or blockage, the main valve will within a short time shut and remain shut, until the device is manually reset and the pilot reignited.

> New Extinguisher for Liquid Fires

The introduction of a leak-proof 10 lb. carbon dioxide fire extinguisher, model 1510, is announced by Nu-Swift Ltd., Elland, Yorks. The result of three years experiment, the new model supersedes a similar Nu-Swift extinguisher of the same capacity, known as model 1210.

Mainly intended for fighting inflammable liquid fires, and fires involving electrical equipment, indoors, the new extinguisher has a 15 ft. range compared with only 8 ft. in the case of the old model. This, by preventing the fire fighter from getting burned, is an important feature. Additionally, by redesign of the nozzle, the fire fighting capacity of the extinguisher has been doubled, the new model being capable, in the hands of an experienced fire fighter, of putting out an 18 sq. ft. inflammable liquid fire.

Carbon dioxide, although much less efficient for fire fighting than dry powder,



Nu-Swift model 1510 extinguisher with quickrelease trolley

is non-damaging in use and leaves no residue, while the carbon dioxide can be made to penetrate into places otherwise inaccessible. Hence it is particularly suitable for fighting fires in laboratories, or fires involving fine chemicals.

Aluminium Alloy Barrel Skid

A new aluminium alloy barrel skid is made by Powell and Co., Burry Port, Carms., to an exclusive design and specification, that combines maximum strength with lightness. Fitted with steel hooks it can be safely and easily handled, thus reducing the risk of accidents. The runners have wood battens positioned along the top of the metal section and these can easily be replaced if worn. Available in three standard lengths of 8 ft., 10 ft., and 12 ft. the skids are ideal for loading and unloading metal drums, wood barrels, cylinders, etc.

Quasi-Arc Safety Devices

A new range of Quasi-Arc low voltage safety devices has been designed to reduce the open circuit voltage of a.c. are welding sets to a safer value. Quasi-Arc Ltd., Bilston, Staffs., state that three models are available: type SD.350 for use with single operator a.c. sets with an open circuit voltage range of 80-100 and maximum output of 350 amp.; SD.450, similar specification to SD.350, but suitable for use with sets giving currents up to 450 amp.; SD.450M, specially designed for use with multi-arc regulators of 350 amp. and 450 amp. capacity.

These devices reduce the open circuit voltage from 80 or 100 to 30 volts without interfering with the welding operation.

Pressure Relief Valve

A range of sewage gas control and safety devices for the chemical industry can now be manufactured by Wm. Neill and Son (St. Helens) Ltd., Bold Iron Works, St. Helens Junction, Lancs, under licence from the Vapor Recovery Systems Co., U.S.

Varec pressure or explosion relief valve (No. 70) is designed to provide emergency relief venting for storage tanks, low pressure vessels and gas piping. With a cast iron base, aluminium cover and bronze or aluminium pallet and valve seat with stainless steel pallet guide stem, they are fitted with 3-mesh bird screens to prevent entrance of foreign matter. Valve seats are replaceable. Pallet drip rings reduce possibility of freezing by eliminating condensate collecting at the seats.

Air Filtration Materials

W. and R. Balston Ltd., manufacturers of Whatman filter papers, are now developing a range of air filtration products for commercial and scientific application in the high efficiency field. After several years research and development the company has installed special plant and equipment for air filtration work and to develop high efficiency filter media in a wide range of materials to almost any given performance specification. The bulk of particulate matter under 1 micron will be removed from air. Applications are in very fine dust areas and nuclear energy, where beryllium dusts and particulate radioactive material are serious hazards.

The range of materials includes glass fibre filter papers made without any binders and having a performance of 0.001% penetration on the methylene blue test according to B.S. 2831/57; This represents an efficiency of better than 99.99%. Glass fibre paper is suitable for use at temperatures up to about 1000°F. and work is in progress on materials capable of filtering hot air or gases at temperatures up to 1000°C. Special low resistance glass fibre papers and ready-formed filter elements are also being developed for industrial respirators to the specifications of the recently modified B.S.2091.

Plastic fibre filter paper, high efficiency 'ashless' filters for air sampling and analysis, papers incorporating adsorption materials for the removal of vapours and gases, silicone treated glass fibre and special air sampling papers all form part of the research programme of W. and R. Balston Ltd.

Several standard products, including the

100% glass fibre papers, are available in reels up to 48 in. wide. The company is prepared to consider the development of special papers; all enquiries should be addressed to the sole selling agents, H. Reeve Angel and Co. Ltd., 9 Bridewell Place, London E.C.4.

R.F.D. Air-supplied Suit

Many of the products manufactured by the R.F.D. Co. Ltd., Godalming, Surrey, have been designed in close collaboration



R.F.D. Plus-pressure mask in use at the Speke Works of Distillers Co.

with the chemical industry. Among their more recent developments are the air-supplied suit mark IV, the Splashcheater neoprene-coated fabric apron and special combination suits with hood and goggles attached made in p.v.c./Terylene laminate for protection against H.T.P. and other rocket fuels.

The newly developed R.F.D. air-supplied suit MK IV is one-piece and is worn in conjunction with the R.F.D. 'plus pressure' mask and supplied with emergency oxygen equipment. It has been developed in collaboration with the Associated Ethyl Co. Ltd. for cleaning leaded gasoline storage tanks. The suit will give full protection from toxic vapour, fumes and dust, etc. and provide a supply of cool air to all parts of the body. The suit is made from p.v.c. white coated fabric of exceptional strength and zip-fastened with a double-overlapping press-stud flap.

The 'plus pressure' mask and the 360

The 'plus pressure' mask and the 360 air fed hood are compressed air-fed and are said to be gaining popularity because there is no resistance to breathing; the cool fresh air stream is comfortable to work in. Other new products in an advanced stage of development, are a shot blast helmet and a wet evaporation suit for chemical protection in conditions of high temperature.

Floor Degreasing Crystals

Sealocrete degreasing crystals have been developed by Sealocrete Products Ltd., Atlantic Works, Hythe Road, London N.W.10, for the removal of oil, grease and fat from concrete floors, making them safer. Regular cleaning with these crystals is said to harden the concrete, making it dustproof and impervious to the action of oil, grease and fat.

When dissolved in hot water, the crystals form an aqueous solution of an alkaline detergent. They emulsify traces of oily or greasy matter present on the surface and in addition peptise and remove the adherent films of soiling matter, often of an obstinately carbonaceous nature from the surface of glass or metal. Also available is non-inflammable Sealocrete degreasing liquid.

Fibreglass Reinforced Plastics

The Plastics Division of Sheepbridge Equipment Ltd., Chesterfield, makes welding masks and machine guards of various types in fibreglass reinforced plastics materials. The welding masks are extremely light and durable, the weight of the mask being just over 1½ lbs. The safety screens can be varied to suit the requirements of different welding jobs. Machine guards can be manufactured in a wide range of shapes and sizes to suit varying needs. Guards in reinforced fibreglass plastics materials are extremely light and durable, and are valuable where high resistance to corrosion is demanded.

Mobrey High and Low Alarm Panel

The Mobrey high and low alarm panel may be used to give indication of either high or low level for steam boilers, storage tanks for all liquids and pressure vessels. Alternatively, the panel can be incorporated in wiring schemes for either high and low temperature or pressure alarms.

The unit includes a green 'normal' light, a red 'low level' alarm light and an amber 'high level' alarm light, the wiring being so arranged that if required the panel can be incorporated in the low level cut-off circuit of automatic firing apparatus. Externally mounted audible warning devices, such as bells, klaxon horns or



Mobrey high and low alarm panel

sirens can be connected to the two alarm circuits. Each of the circuits includes a press button muting switch wired in conjunction with a relay that gives automatic resetting of the unit after muting either the high or low level audible alarm, when normal conditions are restored. Manufacturers are Ronald Trist and Co. Ltd., Bath Road, Slough.

Rotameter Photoelectric Flow Alarm

Photoelectric flow alarm for industrial Rotameters 907 and 914 comprises a light source and a photo-conductive cell (Mullard ORP11 cadmium sulphide). Each is housed in an identical black plastics moulding which clamps to diametrically



Photoelectric alarm fitted to Rotameter type 907

opposite pillars of the chassis. Independent adjustments allow the alarm to be set at the required height and to align the axes of the lamp and photocell centrally through the Rotameter tube.

The manufacturers, Rotameter Manufacturing Co. Ltd., Purley Way, Croydon, state that when light from the lamp falls on the photocell its resistance falls and allows the passage of sufficient current to operate the relay. When the float obscures the light, the resistance of the photocell increases, thus reducing the current, closing the relay and operating the microswitch which makes one contact and breaks another.

Sigmund Zero Gland Leakage Pump

Latest addition to the range of Sigmund pumps is the zero leakage pump, a unit designed for operation where the nature of the liquid pumped demands there be no leakage whatever. Additionally by virtue of its compactness it is suitable for installation in restricted spaces. Constructed in stainless steel the pump is of the canned rotor type eliminating glands, mechanical seals and similar sources of leakage. The bearings are lubricated by the pumped liquid and no contamination by oil or grease is therefore possible. For the same reason maintenance is reduced to the absolute minimum.

The rotating element, mounted on a fixed stationary axle, is hydraulically and dynamically balanced to ensure smooth operation. In consequence there is no thrust bearing in the unit and the life of the rotating parts is considerably extended. The squirrel cage rotor is shrouded by stainless steel, and the enclosed stator is



Sigmund zero gland leakage pump

suitable, in the standard design, for pumping temperatures up to 260°F (127°C). Special windings are available to permit pumping temperatures from sub-zero to 400°F (205°C).

Manufacturers are Sigmund Pumps Ltd., Team Valley, Gateshead 11.

Safety Equipment by Siebe Gorman

A wide range of safety clothing and equipment is produced by Siebe Gorman and Co. Ltd., Chessington, Surrey, and is described in their special booklet dealing with protection in chemical and nuclear engineering. Combination suits can be supplied in p.v.c.-coated Terylene, nylon, rayon, etc., to give protection against acids, alkalis, oils, water and chemicals. With stitched and over-welded seams they have been designed to give full protection with strength and hard-wearing qualities.

Also available are aluminium foil clothing, apron-jackets, leggings, fibre-glass helmets, safety harness, resuscitation apparatus and a wide range of breathing apparatus and respirators. Two recent additions are the V.H.E. respirator which combines efficiency with comfort and low breathing effort and a compressed airline face mask.

Leak Detection

Spot-leak is manufactured by Spectra Chemicals Ltd., High Street, Caterham, for the instant detection of leaks in all equipment employing air or gases under pressure. Spot-leak is said to act immediately giving either a frothing action or a build-up of larger bubbles according to the degree of the leak. It is said to be non-poisonous, non-volatile, harmless to skin or clothes and will not damage metals, rubber, wood or plastics.

Leakproof Joints

Patent nylon free-end couplings and terminals are produced by Airtech Ltd. (Engineering Division), Haddenham, Bucks. Main safety features of these new components are that if manufactured in nylon the fittings weigh only a fraction of the weight of metal fittings. They are robust and are stated to be capable of withstanding pressures of 250 p.s.i.

Nylon being chemically resistant to a wide range of media and being non-toxic, is an ideal material for use with hoses carrying gases and liquids. These Airtech components are capable of sterilisation if used for potable liquids and as they have proved leakproof, they eliminate dangers associated with leaking compressed air and other gases.

Visual Inspection and Observation Equipment

Use of Allen's optical instruments, known as Endoscopes, enables the inside of chemical tanks, plants or other hollow component to be viewed through openings as small as $\frac{1}{12}$ in. or into depths of 25 ft. Endoscopes consist of a train of lenses and prisms held in rigid metal tubes. They carry their own lighting and can also be used for photography in most

cases. They provide a large field of view and are of rugged construction.

Also available are high power binocular telescopic systems, both portable and fixed, for use in explosive plants and radioactive areas, etc., and safety periscopes for viewing through observation 'windows' on pressure vessels and furnaces in potentially dangerous situations.

Manufacturers are P. W. Allen and Co. Ltd., 253 Liverpool Road, London, N.1.

Portable Transformers

The number of electrical accidents associated with portable and transportable apparatus amount to a seriously large proportion of the 687 reported electrical accidents during 1957 (32 fatalities) noted in the Chief Inspector of Factories Report for 1957-fatal accidents 46% and for all electrical accidents, 32%. Atkins, Robertson and Whiteford Ltd., Industrial Estate, Thornliebank, Glasgow, have therefore developed a range of portable transformers for use with portable tools with a choice of voltages for the secondary of 24, 50, 110 or 240V. For portable tools, the 110V is now being standardised, this having an earthed centre tapped secondary and an earth screen between primary and secondary. The voltage on the portable tool will not at any time go above 55V to earth.

Dermatitis and Handling of Epoxide Resin Systems

As Bakelite Ltd., 12-18 Grosvenor Gardens, London, S.W.1, include diethylenetriamine in their range of hardeners for epoxide resins as Q.18964, their technical memorandum No. E.101 deals with dermatitis control in handling of these resin systems. The ethylene amines are used as hardeners for epoxy resins; they are highly alkaline and it is known that in handling them and from animal tests that they are capable of acting as skin irritants and skin sensitisers.

Bakelite recommend good washing facilities and use of Kerodex B.W.2 or Rosalex No. 8 barrier cream. After work hands should be treated with mild fatty ointment, e.g., lanoline or vaseline. As amine hardeners have been found to penetrate rubber gloves and hence contamination can be increased, barrier cream protection is recommended. Protective clothing should be changed frequently and gogeles should be worn.

quently and goggles should be worn. As a further step to reduction of dermatitis in handling epoxide resin systems, Bakelite have introduced modified amine hardeners (Q. 18988, Q. 18905, Q. 18803), which have reduced irritation potential and also a minimum irritation potential (M.I.P.) hardener (Q. 18814).

Static Charge Detector

Designed for the detection of static electricity is the Baldwin Statigun, made by Baldwin Instrument Co. Ltd., Lowfield Street, Dartford, Kent.

The Statigun is being used by a large company on plant producing cellulose acetate in sheet and fibre form, to study production of static, how static is produced, and effect of antistatic measures being taken. Some parts of the process are more dangerous than others, and checks are being made at intervals, e.g., powder in motion above reaction vessels containing explosive mixture of solvent can produce static as it enters the vessel.

Development of Lighter Industrial Clothing

Use of aluminised cloth is being investigated by **Beldam Asbestos** Co. Ltd., Lascar Works, Hounslow, Middx. This type of cloth, it is believed, should give better protection and lighter industrial clothing.

In the company's range of Auto-Klean products, a new range of filters has been developed with flows up to 4,000 gall. per hour and meshes down to 0.001 in. which give high filtration efficiency.

Safety Testing Polivirin



Safety testing of Polivirin, Glaxo's poliomyletis vaccine in special cabinets ensures sterile operations

Telcon Beryllium Copper Safety Tools

A lengthy period of testing has proved beryllium copper to be most suitable of all copper-based alloys for replacement of ferrous tools. The latter constitute adanger when used where dangerous atmospheres are present, because sparking is a property inherent in all ferrous metals which can never be entirely eliminated. Two main causes of the origin of sparks in ferrous tools are first, frictional heat and second, heat due to rapid oxidation.

Tools made from Telcon beryllium copper safety tools by Beryllium and Copper Alloys (Safety) Tools Ltd., 47 Victoria Street, London, S.W.1, can be, as occasion demands, cast, wrought, or manufactured from sheet.

Boraxo Hand Cleanser

Approval of the Factory Inspectorate has been given to Boraxo hand cleanser, produced by Borax Consolidated Ltd., Borax House, Carlisle Place, London, S.W.1, and it has been awarded the certificate of the Royal Institute of Public Health and Hygiene. Completely soluble and containing no harsh abrasives, its effects are obtained without the use of

strong organic solvents which might damage the skin. Chemically, its combination of borax with soap has the effect of reducing the pH value; the mild degree of alkalinity of Boraxo in water solution at 20°C. is reflected in its pH of 9.3. Inclusion of a small quantity of lanolin is of value in restoring the condition of skin exposed to industrial processes.

Kontak Metering Pumps for Toxic Chemicals

Following a period of intensive development, Kontak Manufacturing Co. Ltd., Londonthorpe Road, Grantham, Lincs, have introduced a new series of highly accurate directly controlled metering pumps



Kontak actuating pump

for general chemical applications. Capacities range from 0-1½ up to 180 gall. per hour. The new series is a logical extension to the remotely controlled range of diaphragm pumps, the development of which was initiated by the Atomic Energy Authority at Harwell, in 1953, in conjunction with Kontak for handling highly corrosive, and toxic materials with radio-active content.

Extreme accuracy is one of the major advantages of the pump. The manufacturers claim an accuracy of less than ±2% within specified conditions and ±½% on repeatability under fixed conditions. Among other advantages claimed for the remote actuated pump are its ability to handle abrasive slurries and to run 'stalled' indefinitely without damage, when operating against a blocked system.

Foot Operated Dispenser

The new Brightwell foot-operated dispenser, made by Brightwell Dispensers Ltd., Spenser Works, Newhaven, Sussex, has been specially designed to prevent the wastage of protective creams and resin removing cleansers. Operators can receive shots of cream or cleanser without having to touch any part of the dispenser, an important point in the case of resins and hardeners, for it prevents a build-up of cured material which could be experienced with a direct contact ejection valve.

Safety Cables

One of the safest types of cable for installation in the chemical industry is the M.807 B.I.C.C. M.I. Cable produced by British Insulated Callender's Cables Ltd., 21 Bloomsbury Street, London, W.C.1.

This is a mineral insulated cable with a coppersheath. M.I. cable consists of one, two, three, four or seven solid high conductivity copper conductors embedded in compressed magnesium oxide powder, the whole being contained in a seamless copper tube which forms the sheath of the cable. It is easily bent and the sheath remains free from kinks.

Also of interest is the fully guarded B.I.C.C. system ensuring that all current-carrying parts of the conductor system are adequately insulated at all times and that bare conductors are completely enclosed. This is attained by use of a rubber compound guard of polychloroprene over conductors and shrouds over exposed metal fittings. The rubber compound is stated to be suitable for use in any but the most severe conditions of heat or chemical pollution.

New Ideas in Proofed Nylon from B.N.S.

Most proofed nylon as developed by British Nylon Spinners Ltd., Pontypool, Mon., consists of a nylon base cloth proofed with either p.v.c. or neoprene. There is a wide range varying from 7½ oz./sq. yd. to 16 oz./sq. yd. Characteristics of all the proofed fabrics in nylon are great toughness, durability and tear strength combined with lightness in weight, flexibility and ease of handling together with complete impermeability and immunity to rotting.

Interesting new developments in proofed nylon fabrics include tanks designed for the storage of oil or other liquids. Made from heavy multi-ply proofed nylon fabrics, these tanks are tough but easily transportable as they are collapsible, and can be used for purposes such as water storage at remote desert construction sites. Tanks intended for oil storage are proofed on the inside with oil-resistant nitrile rubbers.

Rubber Safety Boot

Important feature of B.T.R. Armasol footwear made by Footwear Division, B.T.R. Industries Ltd., Herga House, Vincent Sq., London, S.W.1, is a tempered spring-steel plate anchored firmly between the insole and outsole of the boot by a new bonding process. This steel inner-sole is immensely tough and flexible and, together with a steel toe-cap, gives a very high degree of protection against what have hitherto been, according to official industrial accident statistics, two of the most vulnerable and accident prone parts of the feet. Additionally, in many cases where damage to the sole occurs, the boot will continue to give effective service where more conventional rubber protective footwear would have to be discarded.

Eliminating Crane Collisions

The B.T.H. 'Collimit' system was devised by British Thomson-Houston Co. Ltd., Rugby to prevent collision between two overhead travelling cranes working on the same track; alternatively, where two cranes at different levels operate in the same bay, to prevent collision between the lower crane and the load or hook of the upper crane. Equipment comprises two B.T.H. electronic relays—one in each crane—and a small mains transformer

to supply current at low voltage to the system. Two additional down-shop leads—one a potentiometer wire and the other a register wire—are required.

Recording, Controlling and Alarm Devices for Gases

The result of many years' pioneering research and development work by Cambridge Instrument Co., 13 Grosvenor Place, London, S.W.1, is the katharometer, now the primary measuring element of all Cambridge gas analysers of the thermal conductivity type. First employed for hydrogen purity tests and later for now well-known measurements of CO₁ and CO+H₂ in flue gases, the katharometer has been developed to the stage where the company can offer probably the widest range of thermal conductivity gas analysers in the world.

Cambridge make safety equipment in the form of alarms used in connection with dangerous gases and other instruments such as indicators, recording and controlling devices. Completely portable outfits can generally be supplied for most of the gas combinations—CO₂ in air, H₂ in N₃, A in N₃, O₂, in H₄, H₂ in O₂, CO₂ in H₂S, NH₃ in air, SO₂ in air, etc.

Non-Sparking Tools

Stated to give long service and to excel other alloys in their capability of absorbing shock are Carr's aluminium bronze tools, produced by Charles Carr Ltd., Grove Lane, Smethwick 40, Birmingham. Finely cast in aluminium bronze (0.5% maximum iron content) these non-sparking tools are said to be durable and tough in use, acid-resisting, non-magnetic and to possess a high tensile strength. They are subject to stringent tests before passing inspection.

Safety by Fire Venting

Colt dual purpose fire ventilators designed and sold by Colt Ventilation Ltd., Surbiton, Surrey, are operated by manual or other controls for daily ventilation use, but they incorporate a fusible link which, in the event of fire, causes the ventilators nearest the fire to open immediately, releasing heat, smoke and fumes to the atmosphere before they can build up and engulf the entire building in dense smoke, highly explosive unburnt gas and searing heat.



This dual-purpose fire ventilator installed at Lederle Laboratories, Gosport, the Colt heat and smoke exhaust, opens automatically by fusible link in the event of fire. It is also a high-duty extractor-ventilator

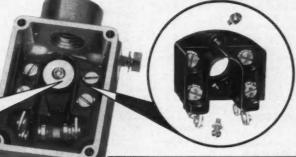
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heavy duty limit switches





WATER OIL AND DUSTPROOF OR **FLAMEPROOF** VERSIONS

HOW TWO ONLY REPLACEABLE UNITS IN

There are only two assemblies in the electrical side of B.S.A. ACME SNAP-LOCK Mk. Il limit switches: a moulded one-piece contact block and the contact arm. Interchangeable on all models they are designed prising these items, complete with holding nut and fixing screws, are supplied at moderate cost. moderate cost.



B.S.A. Acme Snap-Lock heavy duty limit switches have an established reputation for reliability under the most arduous conditions. Recently introduced Mark II versions retain proved features of their forerunners but incorporate refinements in design and manufacture principally to simplify servicing, provide complete interchangeability of assemblies, increase electrical resistance to earth and ensure lasting efficient sealing. Please ask for the Mark II catalogue.

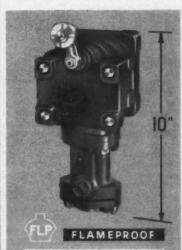


43%

STANDARD WATER, OIL & DUST PROOF

Single pole, double break, double throw, operates with either circuit normally open with other closed, or maintaining in either position, or ovaliable with central (neutral) position and/or ceitive connection. Heavy aluminium die-ceitive connection. Heavy aluminium die-ceitive connection. Heavy aluminium die-ceitive connection. Heavy aluminium die-ceitive connection. Heavy aluminium die heavy aluminium

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(Groups II and III gases). Mechanite iron costings.
Self wriping solid silver contacts, interchangeable
plugs and sockets. Internal mechanism removable
as a unit for servicing. Single SWA cable
entry (standard): double entry if
required. Operating lever position adjustable
in 7.5 deg. increments through 300 degs. Single
pole, double break, having one normally closed
and one normally open circuit. Available thic
central (Neutral) position and/or centre
connection.





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PHONE RELiance 3891

Immediate and automatic fire venting keeps the building clear for the fire-fighters from the outset and the occupants can escape in complete safety away from the fire, for it is largely the dense smoke of fire that causes the panic and consequent loss of life when exits are obscured and the source of fire uncertain.

Properly positioned and designed fire ventilators in the roof of an industrial building take away surplus heat, smoke and furnes vertically which tends to confine and draw the fire together directly underneath the opening, so that the conflagration is approachable, visible and can readily be extinguished.

An additional refinement to the Colt system of dual-purpose fire venting is a very simple and economical fire warning system which sounds an alarm a few seconds before a fusible link parts to open any ventilator on account of heat from an outbreak of fire.

Low Voltage Inspection Lamps

Electric shocks are claimed to be impossible with C.E.A.G. mains-operated low voltage inspection lamps for use in all industrial premises. Produced by C.E.A.G. Ltd., Barnsley, Yorks., the lamp heads can be hung on any handy projection and up to four may be used simultaneously. The unit can also be operated with a special searcher lamp having a 12V 6w tubular bulb in a Perspex head at the end of a rigid or flexible extension for inspecting vessels, cans, drums, enclosed machinery, contents of vats, etc.

Safety Visor

Specially designed for the chemical industry by Chapman and Smith Ltd., Holders Hill Circus, London, N.W.7, is the Sa-Fir Visor No. 57 Chem. This is a large one-piece plastics visor, made to cover corrective spectacles. The frame is extra soft and flexible and fits snugly to the face. Fronts can be supplied in light, medium or dark clear green and smoke. The frame is well ventilated and will not mist up. The vents are screened and are not mere perforations.

Safe Lighting

Safety features are incorporated by Crompton Parkinson Ltd., Crompton House, Aldwych, London, W.C.2, in both their tungsten lamps and fluorescent tubes. For Crompton general service lamps in the 40w-200w range, a new stem fuse has been introduced. The fuse has the same outer form as the older type but the sheath is filled with a finely divided vitreous material which instantaneously quenches and suppresses the arc produced when the fuse blows. This safety feature is now considered as a normal component of the standard Crompton lamp.

Available to special order at low extra cost, is a unique device designed to prevent Crompton high wattage lamps shattering at the end of their life. This consists of a circular platform of transparent material inserted into the bulb during manufacture. This platform does not reduce the lighting

efficiency and is proof against penetration by hot metal. The platform prevents molten metal reaching the glassware.

Cyanide Antidote Kits

For use where cyanides or hydrocyanic acid are used, Cuxson, Gerrard and Co. Ltd., Fountain Lane, Oldbury, Birmingham, provide an Ampin cyanide emergency kit and a cyanide antidote outfit.

The Ampin cyanide emergency kit is for skilled medical use in cases of cyanide



Cyanide antidote kit

poisoning. Each kit is designed for the treatment of two patients by the method of Viana et al (described by A. L. Potter, B.J. Indust. Med., 1950, 2, 125). An Ampin of sodium nitrite 0.3 g. in 10 ml. is injected intravenously followed by an Ampin of sodium thiosulphate 25 g. in 50 ml. Neither Ampin need be removed from the case since each is provided with its own length of plastics tubing, drip chamber and flow control. Also included are Ampins of nikethamide and lobeline for resuscitation, capsules of amyl nitrite, an instruction card and all adjuncts of intravenous therapy. The whole kit is housed in a quickly opened Perspexfronted case with handle for easy carrying.

D.C.L. Bursting Discs

For the protection of plant and equipment against explosions and other sporadic pressure rises, Distillers Co. Ltd., Engineering Division, Great Burgh, Epsom, Surrey, have devised and produced a range of bursting discs to operate under widely varying conditions. The discs are fabricated in a variety of metals and plastics materials suitable for corrosive and other abnormal conditions, and to date have been supplied for bursting pressures as high as 25,000 p.s.i. and as low as 3 p.s.i., and with diameters from ½ in. to 2 ft. Their applications include not only the obvious cases of high-pressure chemical



D.C.L. bursting disc and vacuum support which have burst showing how both opened to provide an unrestricted orifice reactions and the storage of liquefied gases, but also the protection of large-bore transfer and exhaust ducting in which dangerous dust-air mixtures may be produced.

A disc used constantly at a pressure a little below its designed bursting pressure will gradually 'creep' and will finally burst at the lower pressure. The domed discs produced by D.C.L. are hydraulically preformed at pressures exceeding 90% of the design bursting pressure, a patented feature of their manufacture which substantially reduces the 'creep' effect, and which in addition serves to reveal pinholes and other possible weaknesses which are not always apparent in the original foil.

The 'human error' danger that the wrong disc may be fitted in a particular application is avoided in the case of the D.C.L. discs by a coding system (also patented), in which holes in the edges of the discs match pins in the disc holders only when disc and holder are correctly paired.

Portable Radiation Monitors

Designed to meet the requirements of the impending Factories Act for beta and gamma radiation is the Ekco Type N596 beta-gamma survey meter, manufactured by Ekco Electronics Ltd., Ekco Works, Southend-on-Sea. Ranges of 0-3,



Type N596 beta-gamma survey meter

0-30 and 0-300 millirads/hour are provided together with an integration facility up to 30 millirads. The air-equivalent ionisation chamber can be changed readily for an alternative chamber of one-tenth the size for very localised dose rate measurement.

For tracing very small quantities of any radioactive source, Ekco have the Type N645 universal low activity monitor. This is a light-weight portable monitor comprising a transistorised battery-operated ratemeter which is carried on a shoulder strap and connected to a scintillation counter probe held in the hand. Interchangeable phosphors cater for α and β particles, γ-rays, slow and fast neutrons.

Autoset Mercury Vapour Meter

Stated to offer several advances on previous mercury vapour meters, is the Autoset mercury vapour meter, developed by Englehard Industries Ltd., Hanovia Lamps Division, Bath Road, Slough. The meter can be directly connected into a low-pressure closed circuit for estimation

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SOLVENT RECOVERY We undertake complete installations for the recovery of volatile solvents otherwise lost to atmosphere from industrial processes. Virtually complete recovery is effected by activated carbon adsorption or by liquid washing with subsequent distillation where necessary.

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ELECTROSTATIC PRECIPITATION Complete installation for the electrostatic precipitation of dusts, smokes and mists from air and industrial gases.

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AIR & GAS DRYING A necessity for many industrial plants today. We can effect a 100% de-humidification of gases and air using any solid desiccant medium together with refrigeration where necessary.

ADSORPTION SYSTEMS Complete adsorption plant for purification and treatment of air and gas streams and removal of poisonous, noxious or organic vapours.

P.V. 120 VALVE Light construction, low cost, minimum maintenance. When closed is 100% gas tight, replaces with economy conventional heavy type valves for low pressure work—differential pressures up to 5-lb. per sq. inch will handle gases up to 300°F. Made in these diameters 12", 16", 20", 24", 30" and 42". Enquiries for larger sizes invited.



INDUSTRIAL PLANT DIVISION

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of mercury vapour in laboratory or industrial gas systems. Zero adjustment is automatic. Once connected to the supply mains and after the preliminary period of warming up the instrument is immediately available for use without manipulation of the controls, which are pre-set by the manufacturer.

The autoset circuit can be used either to sound an alarm or to operate a control mechanism if the Hg. vapour concentration under investigation rises above a pre-set level within the range of the instrument.

Principle employed is the absorption by Hg. vapour of ultra-violet rays at a wavelength of 2537Å.

English Electric's Flameproof Motors

A wide range of flameproof motors, both squirrel-cage and slipring, has been developed by the English Electric Co. Ltd., Queens House, Kingsway, London, W.C.2. The motors have received the certificate of the Mines Department Testing Station, Buxton, and are certified for methane and pentane. They are thus suitable for use in chemical works and, in fact, in any atmosphere containing gases or vapours included under the heading of Groups I and II in the Mines Department Classification of Gases.

Solenoid Valve for Corrosive Fluids

An electrically-operated solenoid valve, type PL, for the control of corrosive fluids where the fluid passing through the



Type PL Solenoid valve

valve only comes into contact with a plastics material (nylon or high-density polythene) and synthetic rubber has been introduced by the Solenoid Valve Division of Ether Ltd., Caxton Way, Stevenage, Herts. The valve incorporates a \(\frac{1}{2} \) in. diameter orifice and is pilot-operated. The valve can be made suitable for any electrical supply and is capable of controlling fluids passing at pressures up to 40 p.s.i.

3DF2 Steel and Asbestos Fire-Resistant Sheeting

Where there are space or floor loading limitations, light demountable partitions of light angle steel clad with Durasteel 3DF2 composite steel and asbestos fire protection panelling can be considered as an alternative to heavy brickwork. Made by Durasteel Ltd., Oldfield Lane, Greenford. Durasteel 3DF2 is composed of twin steel outer faces bonded to compressed asbestos core to give utmost strength and fire resistance.

By virtue of its fire and heat resistance Durasteel 3DF2 is used as cladding to chemical drying and processing ovens. Such clad ovens are in use at Glaxo Laboratories Ltd.

Safety Shut-Off Valve

Fisher Type 10K is a safety shut off valve, normally installed in a gas distribution system where loss of gas pressure might extinguish the flames of various burners. This valve is claimed by the makers, Fisher Governor Co. Ltd., Airport Works, Maidstone Road, Rochester, Kent, to protect such installations from explosion hazards should the gas pressure be restablished before pilot lights have been re-lighted or burners closed.

When pressure drops to a pre-determined low value on the diaphragm the weights will become unlatched and close the valve; it will then stay closed until manually reset and the lever knock-out device properly connected.

Body sizes up to 6 in. are obtainable. Sizes of weights and diaphragm are available for pressures from a few inches of water to 100 p.s.i.g.

Safety Pipette

Designed to banish the obvious dangers from acids, caustic solutions or other noxious liquids which are ever present



Exelo safety pipette, showing stopcock assembly

when the mouth-suction pipette is used, is the latest Exelo safety pipette manufactured by W. G. Flaig and Sons Ltd., 39 Waterloo Road, London, N.W.2. The new design offers the extra advantage of stopcock delivery control. The stopcock used is the new Exelo flat-type interchangeable type and allows perfect flow control of all liquids.

Fleming Transparent Goggle

Specially prepared for use in chemical atmospheres is the Fleming transparent goggle No. 0080. This eyeshield by Fleming Safety Equipment (Division of J. and R. Fleming Ltd.), 146 Clerkenwell Road, London, E.C.1, is made from non-corrodible chemically resistant materials. The lens section is Cobex rigid p.v.c. and is particularly resistant to the inorganic chemicals (alkalis, salt solutions and most acids) and aliphatic hydrocarbons. Liquids which may attack Cobex p.v.c. are some powerful oxidising liquids and some organic liquids which may have a solvent action on it. surround of the eyeshield, which is of flexible p.v.c. is similarly resistant to most chemicals.

A unique system of ventilation provides

improved protection against liquids, dusts and other harmful particles. Air passing through the ventilating perforations is forced to follow a devious path, which hinders entry of liquids and harmful particles without preventing passage of air.

Flame Spread Retardant Coating

Exolit Firestop flame spread retardant decorative surface coating produced by Exsud Engineering Ltd., 26-27 Cowcross Street, London E.C.1, is stated to prevent flame spread and delay a 'flash-over' on combustible materials such as fibreboard, timber, acoustic board, hardboard, etc. It has been officially tested by the Joint Fire Research Organisation to provide a Class I of BS 476 surface spread of flame rating (surfaces with very low flame spread).

Fairey Safety Ohmmeter

Designed specifically for the testing of explosive circuits is the Fairey safety ohmmeter, or whenever the testing of electrical circuits has to be performed in an environment of explosives or inflammable gases. The principal design feature is a photo-electric cell, which is an inherently safe power source of indefinite life, with none of the hazards and inconvenience associated with batteries or hand generators.

The instrument, which is produced by The Fairey Aviation Co. Ltd., Heston Aerodrome, Hounslow, Middlesex, also incorporates other features designed to ensure safety and reliability.

Rope Sole Industrial Shoes

Main advantage of the Baffeez rope sole from the safety angle state manufacturers Douglas Fraser and Sons Ltd., Arbroath, colored to the feet and greasy surfaces. They are cool on the feet even in extremely hot working conditions. An additional advantage in so far as pharmaceutical laboratories are concerned is that Baffeez footwear can be sterilised.

Thermocouple Fire Detector

A thermocouple fire detector manufactured by the Walter Kidde Co. Ltd., Northolt, Middlesex, is a sensitive means of detecting fire and will respond to low rates of rise in temperature. The detecting element is enclosed in a cast metal case and connections to it are made externally to avoid likelihood of damage during installation. The detector head can be made to respond to any specified rate of rise in temperature.

The basic circuit consists of a thermocouple detector head connected direct to a moving coil meter relay. A rate of rise, depending on the sensitivity of the detector, generates in the detector sufficient current to operate the meter relay. At each end of the meter relay scale are magnetic contacts which once made remain made until manually reset. When the contacts have been made visual and audible alarms are given by an external source of power, either mains or battery, and where the protected space is unattended CO₂ can be automatically released. As many as 10 detector heads can be connected in series.

By circulating a current of a few microamperes through the detector circuit a



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fault warning is given should the thermocouple detector heads or wiring become open circuited.

Roof Crawling Boards

Every year approximately 30 men are killed and 200 injured by falls at work. Many of these falls are caused by men using improvised cat ladders because they have no proper equipment. To combat this, W. C. Youngman Ltd., Manor Royal, Crawley, Sussex, have produced roof crawling boards with many safety points. They are light in all their components and easy to carry up a ladder. They are adjustable and units of different lengths can be assembled to form fitments for any sized roof. The sections lock positively one into another, and when coupled are completely rigid and can be manoeuvred as easily as a single unit.

Potential Indicator

A potential indicator, called the Eversafe, is claimed to be reliable and inherently safe at all times. The makers are Westool Ltd., St. Helen's, Auckland, Co. Durham. All components and connections are hermetically sealed in a thermo-setting resin which is non-tracking and unaffected by heat and acids. The material is transparent and allows for inspection at any time. The unit is designed so that no repair can be made and no broken unit used, and thus it remains safe throughout its life.

Isolator Safety Valve

Inadequate safety valve arrangements have been responsible for many explosions of steam vessels, where steam is supplied through a reducing valve.

The Vulcan isolator safety valve, manufactured by the Vulcan Boiler and General Insurance Co. Ltd., 67 King Street, Manchester 2, has been designed to isolate the vessel in the event of over-pressure. The valve is so arranged than when the safety valve lifts, owing to excess pressure, the supply of steam is automatically cut off and complete protection thereby afforded to the low-pressure vessel.

The design of the valve is based on sound spring-loaded safety valve practice with a fully guided spindle. One end of this spindle extends outside the bonnet to a test handle and the other end, beyond the safety valve head, is extended to carry a fully floating isolator valve head. The latter is held open while the safety valve is seated but as soon as the safety valve lifts the isolator valve is free to follow up and quickly closes to cut off the steam supply and isolate the vessel.



Vulcan isolator safety valve

Valves are stocked for lifting pressures of 5, 10, 15, 20, 25 and 30 p.s.i. and are available in several sizes.

Filters By Vokes

A range of filters and allied equipment has been developed by Vokes Ltd., Guildford, to meet the requirement of industry, where safety precautions are a predominant feature. These products cover a wide range of applications in contaminated air.

The box-type canister filter is normally installed between headers to form banks of



A.E.R.E.-approved glove-box filter

filters of any required capacity. It is loaded with a filtration medium of cotton and asbestos of glass fibres, carded and formed into a lap of uniform density and it is available with or without a built-in pre-filter using a glass-wool filter medium. A typical methylene blue penetration figure is 0.003% (an efficiency of 99.997%) but penetration as low as 0.001% can be achieved.

Filters capable of extremely high dust retention efficiency which places them in the 'absolute' category are Vokes' 33, 44 and 55 'absolute' range. The construction of the 'absolutes' from cellulosic material such as wood and paper make them readily disposable by incineration. The 55 'absolute' filter's exceptional performance in particular, make them ideal for applications where dust leakage could cause serious results.

Fire Hose Reels

Norsen automatic fire hose reels, manufactured by John Taylor, Dunford and Co. Ltd., Barrack Road, Newcastle upon Tyne 4, come into operation instantly. The unreeling of a predetermined length of hose, usually about 10 ft. 6 in., operates the valve inside the reel and in seconds full water pressure is at the nozzle. The recesstype reel can be housed flush with the wall face and will swing through a full 180°.

Pressure Reducing Valves

W. and J. pressure reducing valves are designed by Williams and James (Engineers) Ltd., Chequers Bridge, Gloucester, to give a minimum sympathetic pressure drop with variations of upstream pressure, a maximum flow with a minimum working drop, and absence of pressure creep with no flow. The valve is balanced and is controlled by a diaphragm and two springs, one of which is adjustable for altering the downstream pressure. Absence of glands ensures free operation of the valve without sticking or chattering.

Flame-Proof Stirrers

Flame-proof stirrers manufactured by Voss Instruments Ltd., Maldon, Essex, comprise a range from ½ h.p. to 2 h.p. The motors are built to Ministry of Power specifications and are covered by the Buxton certificate for use in Group 2 gases. They have a clamp for fixing to vessels or a flange for fixing to lids or rails. The shafts and propellers are made of stainless steel, but other materials can be supplied. Normally the propellers are of the three-blade marine type. In addition to the bottom propeller additional adjustable propellers can be fixed anywhere on the shaft and vortex propellers can also be supplied.

Eye Fountains

Accidents to the eyes needing immediate attention can be treated with water from the Tylor emergency eye fountain made by Tylors of London Ltd., 233 Tottenham Court Road, London W.I. Even if temporarily blinded the injured person can use the fountain himself. Regulators ensure an ample supply of water but make it impossible for excessive pressure to injure the eye. Model 1 is operated by a foot treadle with a hand-operated shower for diluting harmful chemicals on clothes or body. Model 2 is mounted on a pedestal and has a hand lever and Model 3 is suitable for mounting on a wall.



Eye-bath by Tylors

Portable Radiation Shielding

Unibrix is a recently developed material giving protection against radiation. The units are chevron-type and interlocking, giving no straight joints. Nine shapes make it possible to build structures of almost any shape quickly with unskilled labour. They may be dry or cemented, for temporary or permanent structures. Approximately 5% water content is retained indefinitely in the brick, a property against neutron absorption.

Specific gravity of Unibrix is 3.4 and 1 cu. ft. weighs 215 lb. For Unibrix I.R. the figures are 4.4 and 272. The makers, Unibrix Radiation Shieldings Ltd., 147 Victoria Street, London S.W.I, state that in practice the highest possible density must be correlated with the cost of the material, its handling and the labour involved in erecting a shield.

Protective Lenses

Safety lenses, both laminated and toughened, are made from Unifort and Salvoc by U.K. Optical Bausch and Lomb Ltd., 68 Hatton Garden, London E.C.I. Unifort is hardened glass which will resist heavy impact from solid bodies. It is of particular use in industry when workers must wear "sighted" lenses to correct a defect of vision.



CLOSURES

Circular, specially reamed ends ensure gas tight closures with rubber bungs. Porous Alumina plugs to prevent iron oxide carryover also available. For use in any high temperature furnace, particularly for carbon and sulphur determination in steel, operating at temperatures up to 1500°C (2,732°F). These tubes are completely reliable, do not devitrify or allow loss of combustion gases even up to maximum working temperatures. Thermal aluminous porcelain 525 sheaths are excellent for use as pyrometer sheaths up to 1500°C.



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Overseas News

WORK ON FIRE-RESISTANT PLASTICS BASED ON POLYTRICHLOROPRENE

A means by which fire-resistant characteristics can be incorporated into plastics has been announced by W. A. Skinner, Stanford Research Institute, Menlo Park, California. The development stems from the successful synthesis of a highly chlorinated monomer, which in turn was polymerised into the plastic material, polytrichloropropene—a material that will not burn and has a high melting

Perhaps more significant than the development of a new plastic, Mr. Skinner said, is the fact that the monomer can be built into common plastics such as polythene and polyvinylacetate, adding to these polymers the property of flameresistance. Possible first uses for the new monomer are seen in building flameresistance characteristics into water-based paints. Other predicted applications are for defence purposes, particularly in airframe manufacture.

The possibility exists, Mr. Skinner said, that the monomer may co-polymerise with many other synthetic materials. If it will combine with butadiene, for instance, a flame-resistant rubber could be made for tyres or electric wire coatings. Fabrics, drapery materials, and wrapping materials may also be made flameresistant.

Combustion resistance of materials containing the chlorinated monomer will be permanent, it is stated, since the new method of co-polymerising makes the flame-proof molecules an integral part of the polymer chain.

Montecatini Invest \$5 Million in Peruvian Fertiliser Plant

Montecatini have invested \$5 million in the first synthetic-fertilisers plant that has been built in Latin America. This plant, erected at Callao, Peru, will be operated by Fertilizantes Sinteticos Sociedad Anonoma (Fertisa), 80% of whose capital is Peruvian.

Lube Breakthrough by Celanese

New synthetic lubricants developed by the chemical division, Celanese Corporation of America, 180 Madison Avenue, New York 16, New York, U.S.A., have overcome the heat barrier set up by high bulk oil temperatures in jet engines, it is stated.

The lubricants are said to withstand 425°F-more than 100°C higher than any previously available. They also meet viscosity requirements at temperatures down to -65°F.

According to Celanese, potential of these lubricants has barely been touched. It is believed that they may become of utmost importance in such broad fields as heat transfer, automotive, and steel and aluminium forming.

20% Rise in U.S. Aerosol Production in 1958

Total of non-food aerosols produced in the U.S. in 1958 is estimated, according to Chemical Specialities Manufacturers' Association, at 470 million units, valued at \$470 million, compared with the 390 million units in 1957.

Heading the list of aerosol products again were hair sprays-more than 100 million units. Insect sprays, coatings and shaving cream totalled about 60 million

Canada's First Acrylic Emulsion Plant

Rohm and Haas Co., of Canada Ltd., has started construction of a new plant at West Hill, Ontario, to produce acrylic emulsion for the first time in Canada. Company officials estimate the potential market for acrylic emussion in Canada used as a finishing material to improve the feel of natural fibre textiles and as an ingredient in paint manufacture, will range from 10 millon to 20 million lb. a year. Plant capacity is expected to meet total Canadian demand for several years.

Third Expansion at Canadian **Polythene Plant**

Expansions at Union Carbide's Montreal East petrochemical plant will raise the capacity of the polythene plant by

60% to 65 million lb. a year.

Since the spring of 1957 when the company's large synthetic chemicals and resins plant complex went on stream, there has been a continuous expansion. The present expansion is the third phase and will make the company Canada's biggest producer of polythene.

The other producers of low-density polythene are Canadian Industries Ltd., Edmonton, who will complete a new growth phase about midsummer, raising capacity to around 40 million lb. a year.

Two other producers are now entering the race with a new type polythene-Dow Chemical of Canada and Du Pont of Canada. Dow Chemical have completed their unit at Sarnia. Du Pont's plant is scheduled for completion by early 1960, also at Sarnia.

General Electric to Erect First U.S. Polycarbonate Plant

First commercial polycarbonate plant in the U.S. is to be built by General Electric's chemical and metallurgical division on the Ohio River, near Mount Vernon, Indiana.

The project is described as a multi-

million pound, multimillion dollar unit. It is scheduled to go on stream in the third quarter of 1960. Polycarbonate resin, GE trade name of which is Lexan, is to be used for electrical motors and fuel engines, electronics and appliances.

U.K. Exports to Spain

Britain's exports to Spain in respect of chemicals during the first quarter of 1959 totalled £358,000, or 6.5% of total exports, compared with £430,000 (7.9%) for the corresponding period in 1958. For the whole of 1958, the figures were £2,141,000 (8.8%), as against £1,809,000 (6.9%) for the whole of 1957.

Hungary's First P.V.C. **Plant**

The first p.v.c. plant in Hungary has been completed. It is attached to the Hungaria Chemical Works in Budapest and will start operations shortly with an annual output of 600 tons

Catalyst Effective for Ethylene-Isobutane Alkylation

Texas City Laboratories of the American Oil Co., U.S., reported the develop-ment of a new alkylation catalyst. A complex of ferric pyrophosphate hydrate with boron trifluoride has been found to be particularly effective for ethylene-isobutane alkylation, producing the low-boiling, high-octane (RON = 103) hydrocarbon, di-isopropyl. The new catalyst is said to avoid handling and corrosion problems and short life characteristics of previously available catalysts for ethylene alkylation reactions.

Callery's Missile Fuel Contract

Callery Chemical Co., U.S., have signed a contract with the U.S. Air Force to supply Hical, the high-energy boronbased fuel used in missiles, rockets and high-speed aircraft.

" Air and Water" Feed Millions

Norway's biggest chemical concern Norsk Hydro is producing sufficient chemical fertilisers to supply food for 10 million people a year, according to an article in "Norway Exports". Norsk Hydro produces 250,000 tons of pure nitrogen a year, and nutrition experts calculate that one ton of nitrogen in the form of fertiliser can produce sufficient food for 40 persons for a year.

Norsk Hydro bases production on the ammonia process involving the electrolysis of water and the distillation of air. Water and air are thus Norsk Hydro's chief raw materials, and water also provides the electricity which Norsk Hydro uses at the rate of 4,500 million units

annually.

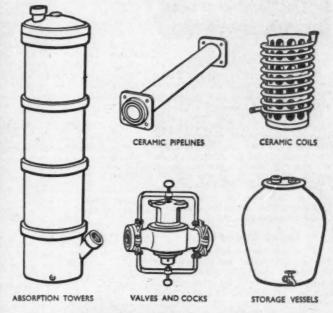
Montecatini To Erect Plant

Montecatini Co. at Charleston, U.S., is going to float soon a \$10 million loan (bonds) to finance the erection of a plant near Charleston in Western Virginia, U.S.A. The plant is to produce polypropylene and other chemical derivatives of petroleum; it will be the first plant to be operated by Montecatini in the U.S.

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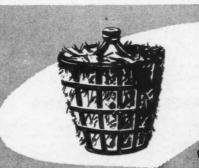
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Commercial News

Aspro-Nicholas

A fourth quarterly dividend of 6% for the year ended 31 March 1959 by Aspro-Nicholas Ltd., makes a total of 24% for the fifth successive year.

Group trading and investment income was higher at £703,346 (£683,708), after charging heavier depreciation of £227,718 (£169,857) exchange loss, mainly due to the French franc devaluation, £32,396 (£39,633) and directors' remuneration of £65,309 (£55,102).

Tax absorbs £422,566 (£413,893) and with the previous year's income of £39,683 (£27,488) group net balance is £320,463, against £297,303.

British Drug Houses

The British Drug Houses Ltd. expect that one or more of the products they have under examination will reach the point of issue in 1959, the chairman, Mr. Geoffrey C. R. Eley, stated at the annual meeting.

Mr. Eley said the B.D.H. offer for J. R. Gibbs Ltd., pharmaceutical wholesalers, Paignton, had been accepted by all the shareholders.

Cooper McDougall

The formal offer by Wellcome Foundation for the ordinary shares of Cooper McDougall and Robertson (see CHEMICAL AGE, 30 May, p. 909) has now been sent to shareholders. All the Cooper directors except Mr. G, F. Taylor and Mr. T. A. Robertson will continue in office. It is proposed that Mr. Taylor shall be paid \$1,000 and Mr. Robertson £3,000 as compensation for loss of office.

Courtaulds Ltd.

Directors of Courtaulds Ltd. say there are grounds for confidence that the decline in profits reflected in previous years has now been arrested. This, with the expectation in the immediate future of a modest improvement in group results have influenced the board to recommend a final dividend 6½% (5%) making 94% (8%).

Group balance from trading and investment income, before tax, declined from £13,918,669 to £13,539,335. Group net profits, after a reduced tax charge, were £7,290,846 (£6,938,233); parent's net balance was £4,848,301 (£4,310,743).

Gas Purification

E. V. Industrial Ltd., have bid for the capital of Gas Purification and Chemical Co. Terms proposed are one new ordinary share of 5s of E. V. Industrials for each 5s share of Gas Purification in respect of which the offer becomes effective. The offer is stated to be worth about £2.69 million. Gas Purification have an issued capital of £679,787 in 5s shares.

Laporte Industries

Laporte Industries Ltd., holding company, announce that they have acquired for a total consideration of 1,285,715 Laporte ordinary 10s shares, all the issued capitals of Sheffield Chemical Co., James Wilkinson and Son, and Glebe Mines.

Sheffield Chemical are manufacturers of sulphuric acid and iron oxide, and James Wilkinson and Son supply a wide range of industrial chemicals. Both companies operate at Sheffield and Rotherham. Glebe mines and processes, fluospar, lead and barytes at Eyam, Derbyshire.

Morgan Crucible

Final dividend of 7% is being paid by Morgan Crucible Co., making 12% less tax for the year to 29 March (10%), plus a capital distribution of 3d per £1 unit. Subject to audit, group profit, before tax, declined to £1,720,798 (£1,901,479). Tax took £848,874 (£956,513).

Sadler and Co.

No dividend is declared by Sadler and Co., manufacturing chemists and tar distillers, for 1958. In 1957 an interim of 5% was followed by a 6% non-taxable distribution made in lieu of a final for 1957 and of an interim for 1958.

Permutit Co.

Apart from uranium extraction plants, chairman of Permutit, Mr. R. T. Pemberton, states that export sales have improved. Profit before tax of £168,968, was £323,468. Since future results must be influenced by the rate of which new developments became available, the company's directors consider it vital that even greater efforts should be concentrated on both chemical and mechanical research.

Considerable progress has been achieved on the electrodialysis process but the chairman warns that this invention is only the start of a costly effort to produce a dependable product at an economic price. With regard to a new

type of uranium extraction process licensed from C.S.I.R.O., a plant of this type has recently been installed by Permutit in Australia.

L'Air Liquide

Profits, after reserves, of L'Air Liquide, Paris, France, amounted to Fr.2.075 million, an increase of 12% over those of 1957 and of 25% over those of 1956. Under the present state of the fiscal law the net dividend is fixed at Fr.650 per share for both old and new shares and at Fr.3.673 per founder's share.

Reviewing development of the company's traditional activities, i.e. production and distribution of gases, the chairman, Mr. Jean Delorme emphasised the mass production of oxygen to meet the large demand from consumers. Progress has been made in the development of deuterium separation units through hydrogen liquefaction and distillation for heavy water production, and of ethylene and propylene extraction and purification plants for the manufacture of plastics.

Montecatini

A registration statement has been filed by Montecatini Societa Generale per l'Industria Mineraria e Chimica Anonima (Montecatini) with the Securities and Exchange Commission covering \$10 million of sinking fund dollar debenturers due 15 June 1979 and warrants to purchase capital shares of the company. Lazard Freres and Co., Lehman Brothers, and Kuhn Loeb and Co., are managing underwriters for the proposed offering, which is expected to be made about 24 June.

According to the registration statement, Montecatini intend to apply the net proceeds of the financing to the construction in the U.S. of a plant for the manufacture of isotactic polypropylene and other petrochemicals.

Market Reports

ZINC OXIDE PRICES STILL FLUCTUATING

LONDON Conditions on the industrial chemicals market have shown little change on the week, and the price position, with few exceptions, is unchanged. The movement on home account, in the aggregate, has been fairly substantial. A steady call has been experienced for the usual run of the soda and potash products, and there has been a good seasonal inquiry for citric and tartaric acids. Interest in agricultural chemicals has been well maintained.

Further fluctuations in zinc oxide prices have been notified, the prices operating from 8 June showing a reduction of 30s per ton; red seal is currently quoted at £92 10s per ton for 2-ton lots delivered.

Business on the coal-tar products market has been steady with available supplies finding a ready outlet.

MANCHESTER The demand for bleaching, dyeing and finishing chemicals on the Manchester market during the past week has been on a fair scale, though still below the best. In most other directions, the demand for deliveries against existing commitment has again been on reasonably steady lines, and a fair number of fresh enquiries have been in circulation. Export demand has continued on fairly satisfactory lines. Few price changes of any consequence have occurred. The movement of fertiliser materials is now comparatively slow, but a quietly steady demand is reported in creosote oil and other leading tar products.

GLASGOW Business during the past week on the Scottish heavy chemical market has again been well maintained, with the overall position one of considerable activity. Although demands were mostly against current requirements, contract deliveries were well taken up. Prices mostly remained firm. The report on agricultural chemicals is still unchanged, with a continued volume of activity both in regard to inquiries and demands. The overseas market remains satisfactory, but as already reported, some improvement would be welcomed.



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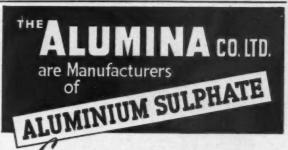
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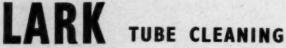
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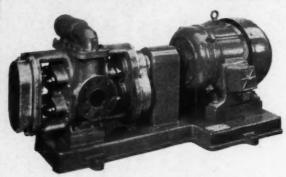
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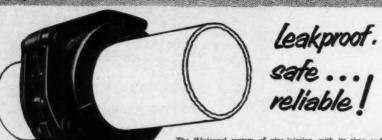
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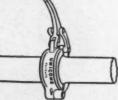
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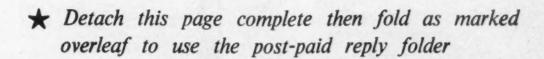
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